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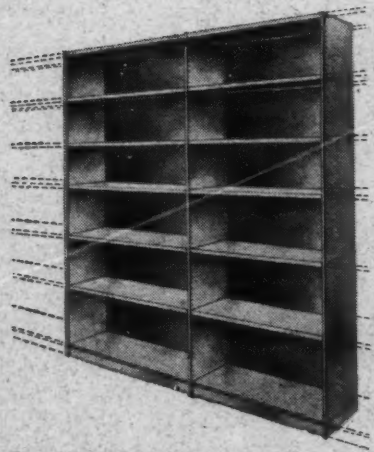

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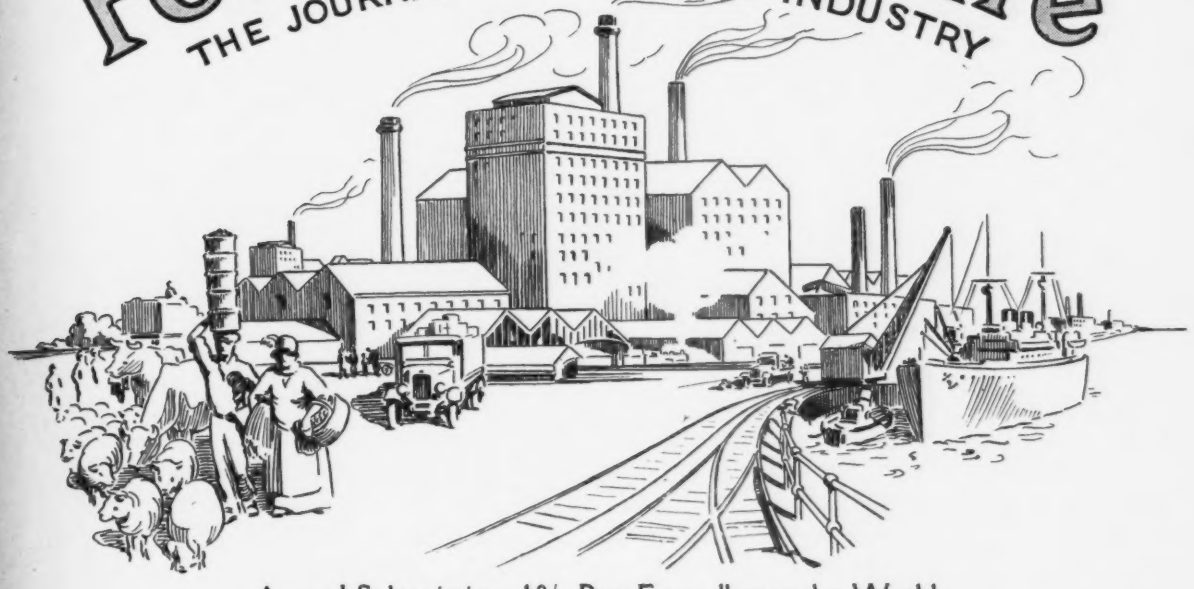
Food Manufacture

THE JOURNAL OF THE FOOD INDUSTRY



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The editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings whenever possible.

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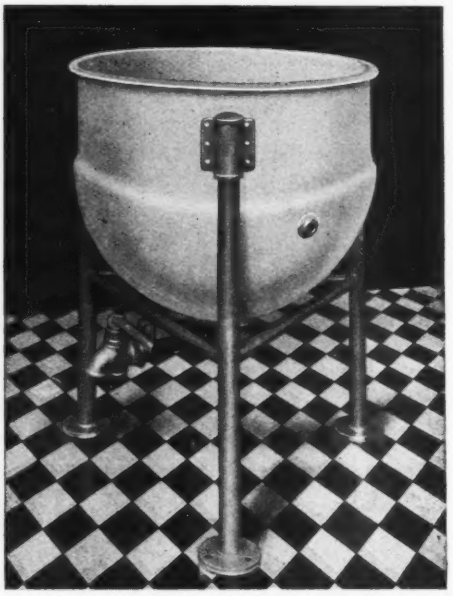

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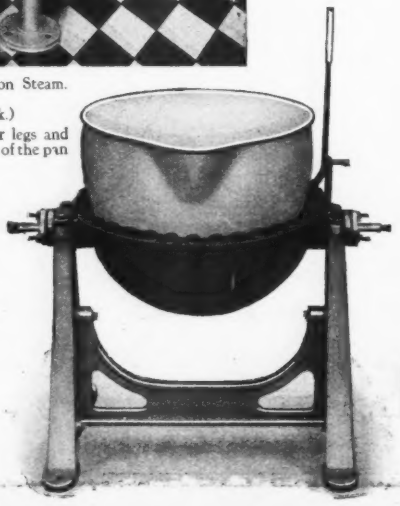

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Food Manufacture
The Journal of the Food Industry

Vol. V. July, 1930 No. 7

Canned Foods.

A RECENT paper in a French journal (*Ann. Fals.*, vol. 23, pp. 30-36) gives an interesting account of the difficulties encountered by canners in France. The authors of the paper, G. Bidault and G. Hinard, consider that most cases of abnormal odour and flavour in canned foods are due to the use of a poor grade of rubber gasket. They point out that the gasket should be plastic enough to form a tight seal and strong enough not to be squeezed partly inside the container. The most important point about the composition of the rubber is that it should contain no regenerated rubber or artificial rubber containing oils; vulcanisation should be dispensed with. When heated to the temperature necessary for sterilisation, the gaskets should give only a slight odour of pure rubber.

Robot Salesmanship.

Some notes we made a few months ago on the possibilities of "talking advertisements," and which at the time were considered in some quarters as rather facetious, appear to receive backbone from a circular which has recently come to hand. This suggests the application of a "reliable portable sound-film projector" to conventions, exhibitions, and the board-rooms of prospective customers, and such an apparatus, it is stated, can now be hired for a day, a week, or even longer period, at an inclusive charge including the services of operators. Heaven preserve the operators!

The contribution of three large motor vehicles, each fitted up as a moving picture hall, with "talkie" apparatus and screen, for the purpose of touring Italy to spread agricultural and fisheries propaganda, has just been made to the Italian Government by a Trieste foodstuffs concern. The films used will be those furnished by the "Luce," the official Italian news reel organisation, and will show the efforts being made by Italy to make itself self-supporting in the matter of foodstuffs, and the progress it has made during the last few years.

Course in Dietetics.

When the new branch of King's College opens for the winter term in the completed buildings devoted to household and social science, a special feature will be made of the course of dietetics. This course, which is to consist of twenty lectures and forty hours of practical work, will be held in the evenings. It has been thus arranged to meet the demands not only of the college students, but also of many others, such as school and institution matrons, teachers, lady almoners of hospitals, who are interested in the subject and are unable to avail themselves of a day course.

The new block of buildings brings to a completion the original design of the college on Campden Hill which was commenced fifteen years ago. It will have accommodation for at least part of the teaching staff and for three dozen students to live in. Other departments include residence for the warden, staff common room, students' common room, cloak rooms, offices, and the fine new lecture hall.

Packing Courses.

The Institute of Meat Packing of the University of Chicago has announced courses for the year 1930-1931. The Institute of Meat Packing is administered by representatives of the University of Chicago and of the Institute of American Meat Packers, in co-operation.

The Institute gives specialised instruction in subjects pertinent to the meat packing industry under three general plans. Evening courses are offered through the "downtown" college of the University to those who are engaged in the industry in Chicago; correspondence courses are offered to men engaged in the industry outside the city; and a course of

study in residence at the University is offered to those who wish to get a comprehensive view of the industry as well as a specialised education in preparation for entrance into the packing industry. Special research work in the physical sciences, economics, and business as applied to the packing industry is also being conducted by a number of graduate students.

Container Discoloration.

The following is an abstract of a paper recording the results of an investigation on the discoloration and corrosion of the inner surfaces of containers for canned foods, by W. D. Bogatsky, W. A. Biber, and L. G. Kischinewskajz (*Z. Unters. Lebensm.*, 1929, 58, 506-517.)

The black stains on the inner surfaces of tinned-iron containers have been investigated and were found to consist largely of metallic sulphide. By exposing containers for 1 hour at 3 atm. pressure to the action of an emulsion of equal parts of 1 per cent. acetic acid and sunflower oil to which was added albumin, cystine, or allyl sulphide, it was shown that the discoloration is caused by the sulphur constituent of the can contents. Allyl sulphide in acetic acid also produced stains in the cold after 21 days, so that the high temperatures and pressures during processing are not responsible. A number of samples of tinplate from different sources were compared as regards their liability to stain. The presence of lead or copper in the tin film does not appreciably affect the tendency to discolour, but the thickness, and particularly the regularity, of the deposit has considerable influence. The dark patches were found where the tin layer was thin, and they were caused by mixtures of sulphides of tin and iron, the colour of the iron sulphide being visible through the thin layer of tin sulphide. Corrosion of the inner surface of containers is caused by acid juices, and involves dissolution of the tin coating. The resistance to corrosion of tinplates of different origin was studied by determining the amount of tin passing into solution when they were exposed for 21 days to the action of 1 per cent. acetic acid. The amounts varied from 0·15 to 0·75 mg./cm.^{2}, but when an oil emulsion with 2 per cent. acetic acid was used, the corrosion was much decreased and averaged 0·05 mg./cm.^{2} Tinplate which has been given a coating of tin sulphide appeared to be resistant to subsequent corrosion and staining by acetic acid or by sodium sulphide in acetic acid, respectively. Although the colour of the film of sulphide is diminished by the action of an emulsion of oil and acetic acid containing albumin or onions, no blackening occurred. The sulphide layer appears to be unaffected during the sterilisation of fish and vegetable preserves by heating at 100° F. for 1½ hours.

Slaughterhouse Offals.

The larger slaughterhouses, with their extensive plant and equipment, find no difficulty in handling and disposing of the "wastes"; it is in the smaller places, where the resources are very limited, that there is trouble in dealing with the disposal in an economic way. The United States Department of Agriculture, in Circular 63, gives some interesting details whereby the small concern can, with the minimum of machinery and at very little cost, conserve these wastes and convert them in a profitable sideline.

The tankage which has been rendered in the open kettle can, if the weather happens to be cool, be mixed with 10 per cent. of its weight of freshly burnt, powdered quicklime. This can be exposed to slow drying in the air without fear of its rotting, and, moreover, very little of the ammonia is lost. In hot weather, when the problem is still more acute, the same effect can be obtained, especially regarding the retention of ammonia, even with raw offals, by mixing with one-third its weight of superphosphate, or, if preferred, with 10 per cent. of the double phosphate. During the air-drying process there is no putrefaction and no breeding of flies. Freshly cooked moist tankage may be treated in the same way with the double or acid phosphate. A good fertiliser can also be prepared by stirring fresh blood with ordinary super and allowing it to dry in the air.

It can be seen that the plant needed for handling comparatively small quantities of offals is not extensive, and the commercial value of the fertiliser produced is considerable.

Rusty Spot in Cheese.

Amongst the reprints of papers by the research workers at the National Institute for Research in Dairying, University of Reading, is one by J. G. Davis and A. T. Mattick, describing their work on the origin of a discoloration known as "rusty spot" in Cheddar and other cheese. When the cheese is broken, the rusty spots are usually found to occur in little moist pockets on the surfaces of fracture which correspond to the original pieces of curd. The spots are usually about 1 mm. in diameter, but in badly infected cheese may run together and spread over considerable areas. The colour varies from rusty brown to bright red. These spots develop within the first month or not at all.

The authors conclude that the organism causing rusty spot is one of the true lactic acid bacteria, which under certain favourable conditions is able to produce pigment in Cheddar cheese.

Kitchen Science.

For several years, radio talks on recent advances in science have been broadcast from the Mellon In-

stitute of Industrial Research, Pittsburg. During the past winter these talks comprised a series of eight, dealing with the selection, care, and service of foods, and the interest created was so great as to induce the Institute to publish them in booklet form under the title "Science in the Kitchen."

Educational propaganda amongst those who are in charge of kitchens and catering establishments is urgently required in this country. Too much emphasis has been placed on "cookery books" and too little on the necessity for a study of fundamentals and scientific organisation. If everyone concerned in kitchen craft were to get a firm grip on the facts set out in the "talk" on the "Care of Food in the Home," we should be able to remark, as does Mr. Beal in the chapter on the "Well-Planned Kitchen," "Is it not a pleasure to look at the kitchen of a modern American home?" In "talk" III., Mr. Morrison says: "If the proper care of foods is thus continuously exercised in the home—or, in other words, if man makes use of his weapons, which are cleanliness in handling, protection from contamination by household pests, storage in cold places, thorough washing and thorough cooking—he is sure of victory over micro-organisms."

Rapid Freezing Systems.

A comprehensive survey of the technical work carried out in connection with the various systems that have been developed for the rapid freezing of fish and meat is given by M. T. Zarotschenzeff in a small book of some 160 pages which has recently been published. This work is the result of a tour of investigation on the other side of the Atlantic, and the inventor of the "Z" process of "fog-freezing" is to be congratulated in presenting a host of technical observations in so attractive a manner. The book is well illustrated. We shall have occasion more than once during the next few months to refer to Mr. Zarotschenzeff's observations.

Canned Foods in Europe.

The Bureau of Foreign and Domestic Commerce, which forms part of the U.S. Department of Commerce, has published a book of 287 pages, entitled "Handbook of Foreign Tariffs and Import Regulations on Agricultural Products—II. Canned Foods in Europe," being No. 85 of the Trade Promotion Series. This important and useful publication, which costs only 45 cents, is designed to assist American producers and exporters of canned foods to plan their foreign business in the light of the duties and regulations of other countries, and it presents—for the first time in English—translations of the pertinent portions of the pure food laws of practically all the countries of Europe. The next two handbooks in this series, now in preparation, cover the canned food markets of the Western Hemisphere and of the British Empire, Asia, and Africa.

It is stated that the United Kingdom is the most important consumer of American canned foods. "Rather vigorous efforts are being made to build up a domestic canning industry, but so far progress has been rather slow, and, because of the lack of surplus supplies of many of the fruits and vegetables canned in U.S.A., it is not thought that British production will ever reach such size as seriously to reduce importation."

The F.I.B. Report.

We have received the Report of the Food Investigation Board for the year 1929, which gives an account of fundamental researches into important problems concerning foodstuffs, such as the freezing of meat, the storage of fruit, the curing of bacon, the rate of evaporation from eggs, the corrosion of tinplate, and so on. Reference will be made to the main conclusions contained in this report in future issues of FOOD MANUFACTURE. Copies of the report may be obtained from H.M. Stationery Office at the cost of 2s. 6d.

Frozen Fruit Damage.

In some recent investigations made on the subject of the damage and spoiling of fruit that has been submitted to refrigeration, it has been found that discoloration of the outer surfaces, gradually spreading inwards, is due to changes produced by oxidation of certain constituents when exposed to the air present in the chilling chambers.

In the course of the researches of Magoon (*Glass Container*, 1930, 9, No. 5, p. 46), strawberries from the coolers were found to contain living micro-organisms ranging in number from 19,000 to 800,000 per gram of fruit. These were classified as follows: Bacteria, 62 per cent.; moulds, 26 per cent.; yeasts, 12 per cent. The commonest forms of spoilage were found to be due to fermentation arising from the yeasts and to moulds of the mucor and penicillium types. To check the damage, it has been found advantageous to wash the fruit very carefully and transfer it promptly to the freezing chambers, where it should be kept until required at a continuously low temperature. Short period and intermittent freezing is practically useless, but if the above method is adopted it results in much less wastage and greatly reduced counts of micro-organisms.

Monkeynuts.

Although groundnuts in the form of oil and oil-cake have quite an important place in British industry as an article of food (then called monkeynuts), they are not taken seriously. In America,

however, this is not so; there the "peanut" industry holds a prominent position in the production of foodstuffs, either roasted, salted, or as peanut butter. Especially in Virginia there are great factories dealing with peanuts only, and employing considerable numbers of negro men and women. D. F. J. Lynch, in *J. Chem. Education*, April, 1930, describes the many processes through which the nuts pass in preparation for the market. After being freed from adhering soil, the stems are removed in machines; they are then shelled and graded very carefully. No. 1 nuts run about forty-two to the ounce; greater numbers (smaller nuts) and those which are rather dirty may be used for making peanut butter, but the practice is not encouraged. It is considered that only clean ones should be used for this purpose, leaving the dirty specimens to the oil extractor. When graded, the nuts are roasted, and may be sold in that condition. There is also an enormous demand for salted peanuts, which are spoken of as a "saleable article in the five and tens"; in this way they have appeared on sale in some of Woolworth's branches, though English housewives prefer to make them themselves. In the factories, the shelled nuts are dipped in hot vegetable oil and then sprinkled with salt. Although figures are not given, the American consumption is spoken of as "stupendous." This is a new industry, dating back not more than twenty-five years, and the world's production of ground or earth-nuts, *Arachis hypogæa*, is enormous; there are over five million acres under these nuts in India alone.

Retorting.

Investigations on the retorting of glass containers have been conducted by the Fruit Products Laboratory of the University of California and the Research Laboratory of the Glass Container Association. In an article to the *Canning Age* for June, J. W. Parcell gives a summary of some of the more important results of these studies on the steam and air method of retort operation.

In the processing of foods in glass containers at temperatures above the boiling point of water, air under pressure is employed with the heating medium to balance the internal pressure of the jars. Two systems of heating are in use; in one, the "steam and air" method, steam and air under pressure are used; in the other, water and air under pressure are used. For tin containers steam under pressure without additional air pressure is generally used during processing; air is used during cooling of large cans after processing.

Parcell reports that, after retort temperature was reached, it was possible to maintain a uniform temperature with air and steam; but rates of heating in different locations were not uniform during the coming-up period. While forced circulation by means of a Pemberthy ejector, plus other improvements described in the article referred to, gave reasonably rapid and fairly uniform heating of the containers, Parcell found in tests with water plus air that the water-air method is superior in point of uniformity of temperature during the coming-up period.

Egyptian Olives.

The Ministry of Agriculture during 1929, as a result of certain experiments, announced that the cultivation of olives in certain districts of Egypt would prove profitable. The districts in question are outlying eastern areas. Five hundred plants have been placed at the disposal of the Frontiers Administration for introduction into certain districts in Sinai, and 2,000 trees have been sent to Mersa Matrouh and certain Red Sea districts. Nurseries have also been established to ensure an adequate supply of trees.

The Ministry has adopted a Tunisian olive (*El Chemlali*), which is also grown in Italy and Greece and yields from 18 to 22 per cent. of oil.

Frozen Fish.

A shipment of brine frozen fish amounting to 60,000 pounds was shipped to England from Victoria, Vancouver Island, in February, 1930. This consignment is said to be the forerunner of many such shipments in the future. That there is a large market for British Columbia fish in Great Britain is not questioned by the trade, and every effort is being made to extend the market for that important commodity, which is now centred in the United States, with a small market in Canada.

Banana Ripening.

During 1929 the Australian Government made a study of the maturation of bananas, and it was found that the presence of coal gas in the atmosphere had a very marked influence in producing a rapid and uniform ripening. Researches are now in progress to determine which of the constituents of coal gas is responsible for this phenomenon. It has been found that the concentration of the coal gas must lie within definite limits. Possibly the absence of light may prove a factor in developing a satisfactory colour in the fruit. It is recommended to maintain the following conditions until the colour change commences: a temperature of 68° F., a relative humidity of 85-90 per cent., an active air-circulation, and a coal gas concentration equal to one part in 2,000 parts of air. Then, when the colour starts to change, reduce the humidity to 70 per cent. and ventilate freely with the aid of a fan.

Methods and Problems in Pickle Manufacture

By M. A. JOSLYN,

Fruit Products Laboratory, University of California.

The following comprehensive article has been specially contributed to FOOD MANUFACTURE *by a well-known authority who belongs to the group of investigators at the Fruit Products Laboratory of the University of California. By years of persistent research this Laboratory has built up a world-wide reputation in matters concerned with the utilisation, causes of spoilage, and scientific control of manufacturing operations of fruit and vegetable products. One of the most valuable features of this work is that it is not purely of a laboratory nature, but is carried out partly in the laboratory and partly under actual factory conditions. It is only in this way that material service can be rendered to Industry.*

PICKLING IS the art of preserving food in a brine or vinegar, with or without a change in the nature of the product produced by bacterial fermentation of carbohydrates. The object of bacterial activities in pickling is twofold—viz., flavour production and the prevention of putrefaction by the production of acid.

Of the many vegetables which can be preserved by pickling, the cabbage and the cucumber in the form of the sauerkraut and the cucumber pickle are preferred in the pickled form. Other vegetables are preferred when preserved by other means—viz., by canning. This paper will be confined to a discussion of the pickling of cucumbers.

The cucumber is one of the oldest of the garden vegetables. Few garden plants have been known and cultivated by man longer than the cucumber. According to De Candolle, the plant originated in the Far East, and has been in cultivation between 3,000 and 4,000 years. The cucumber is a popular salad vegetable, even though it is considered to be somewhat indigestible. However, it does not compare favourably with other vegetables from a dietary point of view, and many people are prejudiced against its use. In the pickled form the cucumber is highly relished by people of all nations. The cucumber pickle is the basis of many of our condiments such as chow-chow, sweet relish, etc.

The pickling of cucumbers began as a household art and exists as such at present in certain rural communities. Most of the world's supply, however, is now produced in commercial plants.

In U.S.A. the commercial production of cucumbers for pickles is about twice that for consumption fresh. In other words, for every cucumber eaten fresh in the form of salad, two are eaten in the pickled form.

The cucumber pickles on the market fall into two general classes of products: the processed pickles manufactured from "salt stock" and the fermented pickles.

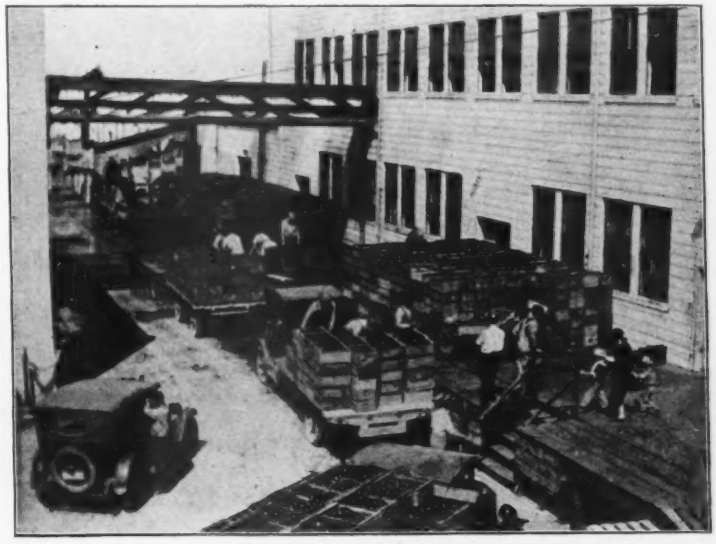
The sweet and sour pickles (both mixed and plain), the pickles used in the manufacture of chow-chow and relishes, and some "dill pickles" belong to the first class. The well-known and probably the only example of the second class of cucumber pickles is the "true" or "German" dill pickle.

Preservation of Cucumbers.

The preservation of cucumbers by pickling depends upon the action of two agents—namely, salt and the micro-organisms present on the surface of the cucumbers. When cucumbers are placed in a brine made of salt and water, or covered with dry salt, the juices and soluble solids contained in them are drawn out. The nature of this action has been found to be dependent upon certain conditions. It has been found that the salt present exerts a selective action on the micro-organisms.

In weak brines, lactic organisms are not inhibited, and, as a result, we have an active fermentation with resulting high acid formation. In moderately strong brines (10 per cent. salt) bacterial growth is inhibited to some extent and the process is both a fermentation and a salt curing. In strong brines (15 per cent.) the bacteria are inhibited and the process is almost entirely one of salt curing.

The cucumbers as they come from the field have been found to be heavily seeded with micro-organisms, and these have been generally found to include lacto-bacilli, aerobic spore formers, gas formers,



Tomatoes being Delivered from the Field in Trucks.

These tomatoes are converted into catsup and sauce on the same day as they are picked.

A Salting Station with Outdoor Salting Tanks.

yeasts, and moulds. Of these, only the lactic acid producing bacteria are essential to a normal fermentation, and the others are more or less harmful, and in some cases may even cause destruction of the fermented product.

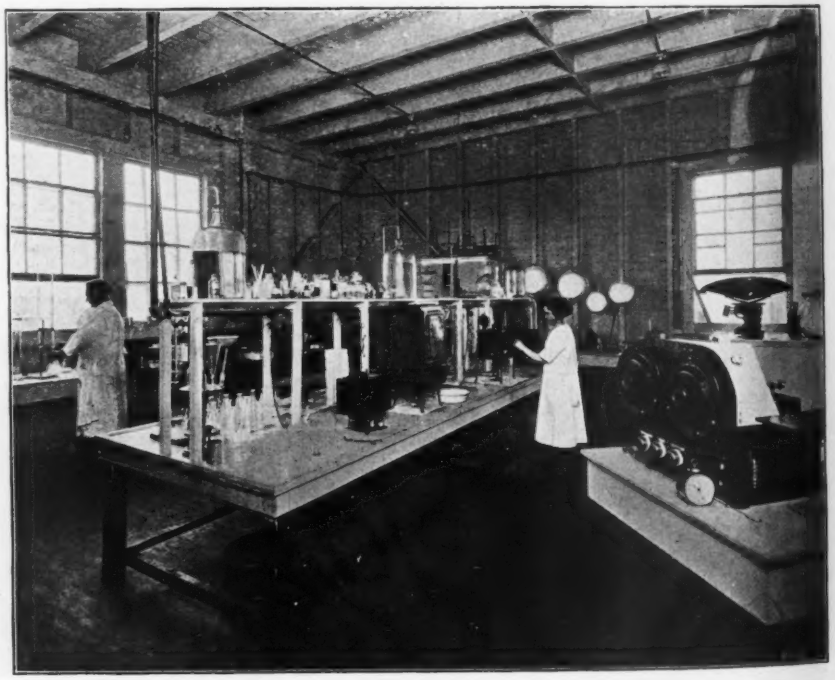
When the salt content is low, as in the preparation of dill pickles, a rapid fermentation takes place, if the temperature is favourable (70 to 80° F.), during the course of which the sugar is destroyed, and acids, principally lactic, are produced to an extent of 1 to 1·5 per cent. This fermentation is caused by a large number of micro-organisms originating on the surface of the vegetables, on the surface of the container, and in the water; however, the numbers in the brine are enormously greater than on the fresh cucumbers. They multiply rapidly in the brine. The lactic acid bacteria produce lactic acid at an optimum rate under anaerobic conditions when the salt concentration is not too high—below 8 per cent. This is the principal fermentation, and produces the acidity to which the conservation of the pickle is due. Many other substances are formed by this rather complex fermentation, among which are included alcohol, succinic acid, volatile acids, mannite, amide bodies, carbon dioxide, hydrogen, methane, and various aromatic esters. When the process is successful the lactic bacteria multiply rapidly first and quickly produce enough acid to restrain the growth of the harmful organisms.

The salt, together with the acid which is formed during this fermentation, acts upon the vegetable tissues and brings about the changes in colour, taste, and texture, which mark the pickled state. During fermentation the cucumbers change in colour from a bright green to a duller olive green, and the flesh of the cucumbers changes from a snow white to a more waxy, partially transparent state. The presence of the salt also tends to harden the product and to check the growth of undesirable organisms.

In the curing of cucumbers for "salt stock" a higher concentration of salt is employed, and a slower fermentation sets in which produces considerably lower amounts of acid than are formed by fermentation in dilute brines, and the multiplication of the micro-organisms is greatly retarded. The preservation of the "salt stock" depends upon the high concentration of salt present rather than upon the acid formed by fermentation.

The Manufacture of Dill Pickles.

Dill pickles are prepared by fermentation in a dilute brine with dill herb and spices, and are marketed in this brine. The spices used consist chiefly of dry bay leaves and whole spices such as cloves, coriander, and pepper. A total of about one quart of dill spices is used per 50-gallon barrel, and 6 to 9 pounds of the fresh or salted dill herb, or of



The Control and Research Laboratory of the California Conserving Co. Careful control of the raw and finished product is maintained by this firm.

dill herb preserved in 100-grain vinegar. The dill herb is distributed in three layers, top, bottom, and centre, and the spices are distributed uniformly throughout the barrel. About 210 pounds of cucumbers are generally placed in the barrel, and after the spices and dill herb are added the barrel is headed up and filled with a 36° salometer (about 9 per cent.) brine. To each barrel is also added 1 quart of 100-grain vinegar, in order to stimulate the growth of the desirable organisms; if dill herb preserved in vinegar is used, 1 quart of the dill vinegar is added. Instead of adding brine, dry salt is sometimes used; about 16 pounds of salt per 50-gallon barrel.

The barrels are then sealed, rolled, and stored at suitable temperature, generally outdoors, to ferment. The fermentation of the cucumbers is a spontaneous one, and manufacturers must take the undesirable organisms along with the desirable ones. Because of this chance inoculation there is a wide variation in the quality of the dill pickles, and although the general character of fermentation is similar in all barrels, no two barrels are exactly the same. With a proper fermentation the pickles are ready for use in about two months.

The pickles are then graded, sorted and repacked in smaller barrels in a 20° salometer brine (about 5 per cent. salt). The pickles should be firm and crisp in texture and of good keeping quality when successfully fermented and properly cared for. Dill pickles should be kept covered with brine and free from air. Exposed dill pickles rapidly soften and putrefy.

Causes of Spoilage

One of the most common forms of spoilage in making fermented pickles is a soft or slippery condition of the pickle. Once the pickles become soft or slippery no treatment will restore them to a natural condition. The investigations* of Kossowich, Aderhold, Kormauth, Zauluchi, Hasbrouch, Rahn, and Le Fevre have shown that an important cause of soft pickles is the activity of bacteria of the mesentericus group.

Bacillus vulgatus, a member of the mesentericus

* F. W. Tanner and I. O. Eagle, "Research in Pickle Fermentation," *Canning Age*, 1926, July, p. 651; August, p. 713; September, p. 787.

Comfortable high-backed stools are provided for women who pack "pickles in patterns" at the California Conserving Co.

group, has been found by E. Le Fevre to be widely distributed. This organism he found in his investigations to be chiefly responsible for softening, especially in brines of low salt concentration. This organism is capable of developing in the presence of 6 per cent. of salt and has a high tolerance for acid media. It is capable of growth in media of pH. 7 to pH 3·8.

This type of spoiling may occur from the entrance of mesentericus organisms, either after the acid is destroyed by scum yeasts, in which case there is a general softening, or the brine becomes seeded before fermentation sets in, resulting in a layer of soft pickles.

During the dill pickle fermentation there are always a few cucumbers that soften and become defective in other ways. These are removed after fermentation when the barrels are opened for sorting. During the season of 1926 the proportion of softened pickles was much larger than usual in several of the Californian factories. At their instigation the softening of the dill pickles was investigated by the Fruit Products Laboratory of the University of California.

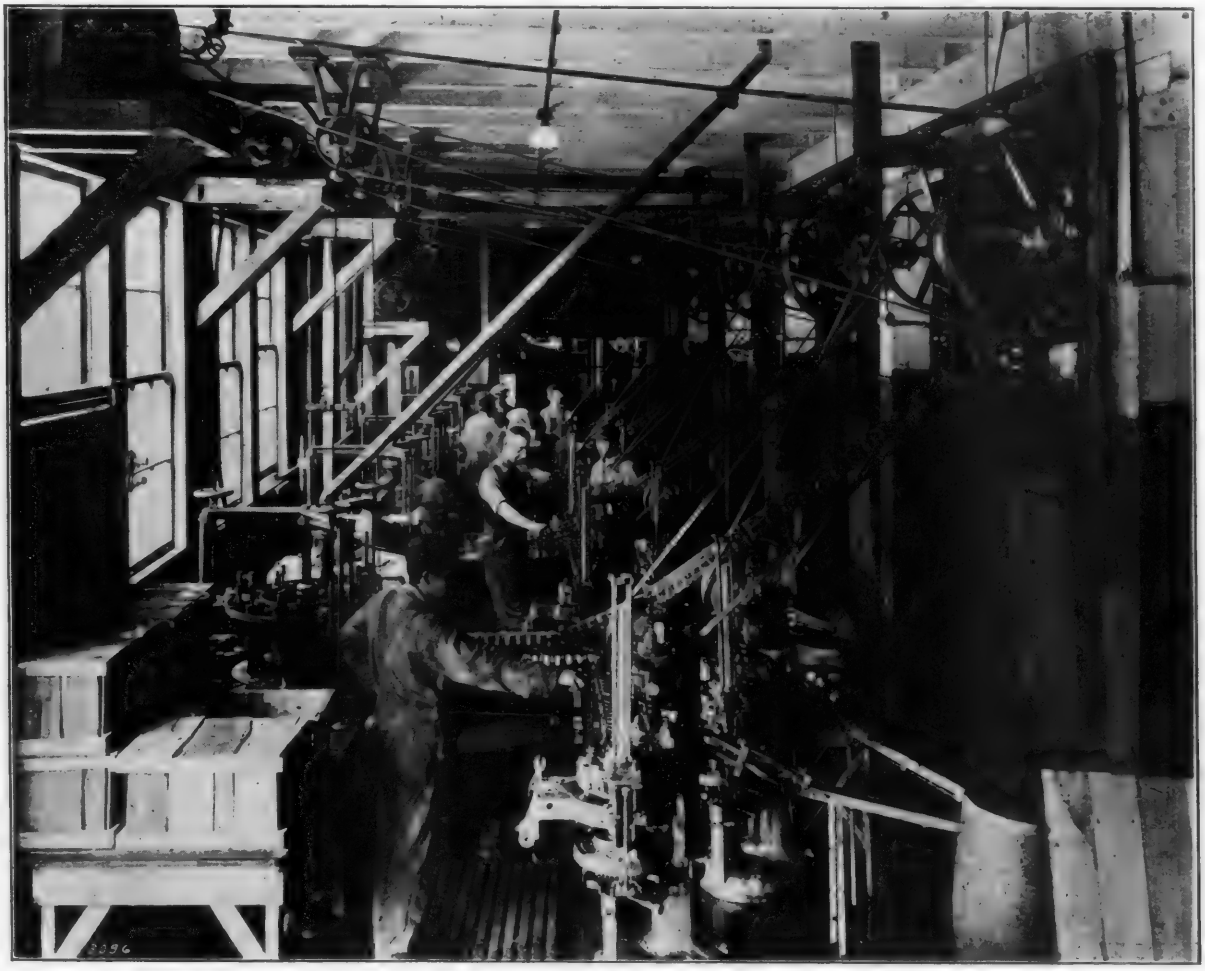
The softening occurred at the blossom end of the cucumber and apparently gradually advanced toward the stem end. In certain cases the smaller cucumbers had a peculiar "blue-nosed" appearance. Slipperiness of the skin was also usually another evidence of the disease. The texture of the affected pickles, especially in advanced cases, was "cheesy," although the flavour, odour, and acidity of the softened pickles appeared to be normal. In many cases, pickles that were firm at the time of sorting later became soft in storage barrels. Apparently all of the softening did not take place during the primary fermentation.

The results of the investigations were as follows:

1. The slipperiness does not all occur at once and increases during storage.

2. Storing the cucumbers under various conditions before pickling is apparently advantageous rather than detrimental to the quality of the pack. In view of this it is interesting to note that at one time it was recommended that pickles be stored in a dry place for one to four days, then washed and packed.

3. Garlic, horseradish, onions, and grape leaves



Canning Lines for Cucumber and Tomato Sauce of the California Conserving Co.

apparently influence the development of slipperiness of pickles.

4. The concentration of salt necessary to limit and to some extent inhibit softening is about 40 to 44° salometer. Below this concentration the percentage spoiled was markedly increased.

5. Decreasing the ratio of cucumbers to brine decreased the percentage of pickles found slippery. This is probably not due as much to decrease in total acidity as to increase in the initial and final salt concentration.

6. Increasing the initial acid concentration by adding vinegar may in some cases produce a decrease in spoilage, unless the concentration is too large, when an increase occurs.

7. The addition of sugar to account for the lack of fermentable material in the pickles decreased the spoilage, probably by fostering a more rapid lactic acid fermentation. In this respect cerelose was better than lactose. At least 2 pounds, and preferably more, say 5 pounds, must be added per barrel under Californian conditions.

8. The addition of starter, especially from a fermenting dill pickle barrel, was of some advantage.

9. The slippery pickle content was not related to the final acidity or pH. The brines were in general at a pH of 3·0 to 3·1. However, decreasing the initial acidity by means of $NaHCO_3$ increased the slipperiness enormously.

10. Washing the cucumbers before packing is very desirable and decreases the spoiling quite markedly.

11. The pickles exhibited a selective susceptibility to softening, the smaller, less mature, and undeveloped pickles being more markedly attacked.

Preparation of Processed Pickles.

In the preparation of cucumber pickles other than fermented dill pickles, the cucumbers are first stored in a strong brine for several months to permit lactic acid fermentation and curing to take place before the cucumbers are processed and placed in vinegar. This treatment is also used as a means of storing the cucumbers. When stored in open tanks, and protected from the actinic rays of the sun, a thick film forms upon the surface of the brine. This film consists at first principally of mycodermas, but later is contaminated with mould and bacteria.

This film, or "scum," when not removed, gradually brings about a destruction of the acid previ-

Canning and Labelling Pickles during the Winter Months at the California Conserving Co.

ously formed during fermentation, and in time may even produce an alkaline reaction in the brine. The reduction in acidity would permit multiplication of putrefactive organisms and consequent spoiling of the pickles were it not for the presence of a rather high concentration of salt. However, if the scum is not removed it starts to putrefy and attracts myriads of flies. The intensely disagreeable odour of the putrefying scum finally permeates through the entire contents of the tank, and in some cases may necessitate prolonged leaching of the salt stock to remove this flavour and odour. Moreover, this scum brings about a discoloration of the brine which may be objectionable.

The fermentation and salt curing of the cucumbers are conducted in circular wooden vats 8 to 14 feet in diameter and 6 to 8 feet deep. These vats are filled with unwashed cucumbers as they come from the field, and enough salt is added to form with the extracted juice a brine containing not less than 10 per cent. salt. Not only must the brine be kept at this strength during the course of fermentation and curing process, but when fermentation is complete the salt concentration should be gradually increased to 15 per cent. in order better to preserve the product. The cured cucumbers are known as "salt stock." They are very salty in flavour, firm in texture, and possess a pleasing fermented flavour.

The fact that this salt stock can be held without material loss for several years places the pickling industry upon a comparatively safe basis. A crop failure in one locality in any particular year does not as a rule affect the work of the factory or change the price of the fresh stock. The reserve salt stock can be drawn upon for the needs of the factory.

The pickle factories maintain gathering points or receiving stations in communities where cucumbers are commercially grown. These are known as salting stations. The equipment of a salting station consists of a long low building provided with a large number of wooden tanks or vats, a common size of which is 10 feet in depth and 16 feet in diameter, with a capacity of about 1,500 bushels. An ordinary salting station will contain forty of these tanks. The handling and gathering of cucumbers at the salting station involve comparatively little labour, but because the cucumbers are not used immediately by the factories, it requires the capital invested to be tied up for a considerable period of time.

At the salting stations the cucumbers are generally salted without washing or cleaning. In some factories the tanks are not under roof, and rain and snow, dust and insects, may fall in. The pickles, however, are not put on the market without being first thoroughly washed.

The cucumbers as they come from the field are generally graded and dumped into the vats. To avoid injury to the cucumbers their fall is generally blanketed by means of 6 to 12 inches of a strong brine (18 per cent. salt), which is placed at the bottom of the tank. Dry salt is also generally added with the cucumbers, about 100 pounds of salt being added with each 1,000 pounds of cucumbers (approximately 5 pounds per bushel). Enough salt is added so that the brine formed with the extracted juice contains 10 per cent. salt. Sometimes, instead of using dry salt, 10 per cent. brine and additional salt are used. After the tanks are filled they are then keyed down by means of a false top, which holds the pickles below the brine.

The high concentration of salt used represses the lactic acid fermentation. A slow fermentation takes place, during which a part of the sugar is converted into lactic acid and a part is acted upon by other organisms to produce gas and other acids and compounds. As the fermentation proceeds more salt is gradually added, the pickler relying more upon the salt than the acid produced for preservation. The acidity of salt stock brine is very low, being rarely above 0·7 per cent., and generally below this in old brines. After the cessation of the gaseous fermentation the pickles are salted down rather heavily; generally the brine tests not less than 15 per cent. salt. If the salt stock is to be held over for several seasons, this is increased to 16 or 18 per cent.

The pickles remain in the brine until they are to be sold or manufactured into sweet, sour, dill, and other kinds. As long as they remain in the brine they keep very well. The appearance of spoilage or abnormal conditions such as "ropy" brine can be readily checked or cured by the addition of more salt. If the tanks are not under roof, they have to be filled up after long drought, or more salt may have to be added after heavy rains. Some control this trouble by putting the tanks under roof, but this brings another difficulty—namely, the pickle "scum."

As these organisms are aerobic, their activity can be cured by sealing open tanks of pickles with a layer of neutral mineral oil. The scum will not form in the absence of air or in the presence of direct sunlight.

The salt stock is generally shipped to a central factory to be converted into the finished product. There the pickles are removed from the brine, sorted, and graded for size, and the excess salt removed by heating them in water in steam-heated vats to about 120° F. for about twelve hours. Large sizes sometimes require two such treatments. This treatment is known as processing.

Sour Pickles.

In making sour pickles, distilled vinegar is used. The cucumbers are placed in a first vinegar of about 4 per cent. acidity. The water and the juices of the cucumber dilute the vinegar and the pickles absorb it. After a storage period of about a week the vinegar is reduced to about 2 per cent. acid. The pickles are then stored in a stronger vinegar of 5 to 5·5 per cent. acid and are then ready to pack in glass jars or cans with a vinegar of 4·5 to 5·0 per cent. acid. The pickles are not immediately placed in a strong vinegar in order to avoid shrivelling due to its osmotic effect. For this reason the acid concentration is generally built up gradually. Short processes in which the pickles are placed directly in strong vinegar are sometimes used, but they yield an inferior product.

Sweet Pickles.

In making sweet pickles, the processed salt stock is treated as for sour pickles. After storage for a few

(*Continued on page 208.*)

The Spoilage of Pickles by Bacteria and its Prevention

From the PICKETT-THOMSON RESEARCH LABORATORY, LONDON

The following article has been prepared at our request by The Pickett-Thomson Research Laboratory, London, in view of the frequent inquiries we receive relating to spoilage problems. We are always glad to receive such inquiries, and have made special arrangements to have them examined and answered free of cost to readers of FOOD MANUFACTURE.

A LARGE amount of spoilage of food preparations such as pickles, sauerkraut, tomato products, sauces, catsups, etc., is caused by bacterial fermentation. Certain species of bacteria ferment the sugar, thereby producing acids, alcohol, and gas. Sometimes slimy growths and scums appear on the surface of alcoholic and vinegar liquids. These growths consist of organisms which are able to oxidise the alcohol and the vinegar to carbon dioxide. First the mycodermata appear; these non-spore forming yeasts are classified with the *Fungi imperfecti*. In addition to these, true saccharomycetes (yeasts) appear in the slime. Finally, various groups of acetic acid bacteria may be present, some of which destroy the acid rapidly. The action of these organisms in acid preserves is to diminish the acid content, thus allowing a development of putrefactive bacteria and, finally, complete spoilage of the preserve. The products of this bacterial fermentation are not generally poisonous, but they may cause an undesirable taste. The sliminess is disagreeable, but this also is not poisonous.

Janke (1922) found that the use of 0·003 per cent. of allyl oil of mustard with 2·5 per cent. of acetic acid was sufficient to obtain a lasting preservation of tomatoes and pickles.

The bacteria and yeast organisms which cause the spoilage of pickles come from the soil in which the vegetable products have been growing.

It is obvious, therefore, that one of the most important measures necessary to prevent spoilage is the thorough washing of the vegetables used in these products.

Vegetables from heavy clay land require a more careful washing than those from light sand land. In fact, it seems almost impossible to remove some of the heavy, sticky clays and the millions of bacteria that such soil contains. Several good types of washers are available. Rotting vegetables should be excluded, as these contain large numbers of bacteria; all rotting and diseased spots should be cut away. Cleanliness in the factory is also essential, since this helps to reduce the amount of contamination with yeasts, moulds, and bacteria. The floor must be clean, as well as all utensils and bottles used. The walls and ceilings should be washed over with a weak solution of copper sulphate to prevent the growth of moulds.

Most of the organisms responsible for the spoilage of various kinds of pickles can be killed by heat. 150° F. for five minutes causes a definite decrease in the number of living bacteria of all types. *Leuconostoc pleofructi*, which occurs on tomatoes, is killed almost instantly at this temperature. Some other types of bacteria are more resistant, a few survive even after being heated to 150° F. for thirty minutes. At 170° F. all of the organisms are killed within a few minutes, except the spore-bearers, but these latter do not appear to play much part in the spoilage of pickles. Heating, as a rule, however, is not used in the preparation of pickles, except that the vinegar may be boiled. Before pickling in vinegar the vegetables are generally placed in a solution of brine. This brine treatment is carried out for three reasons:

1. To furnish the osmotic force for the withdrawal of the vegetable juices.
2. To furnish the proper flavour to the product.
3. To inhibit the action of harmful organisms.

The degree of salt concentration in the brine used has a decided influence upon the number and character of the organisms present.

In a weak brine containing about 5 per cent. of salt such as is used in making dill pickles, the growth of micro-organisms is but little inhibited. In such a brine the lacto-bacilli multiply rapidly and the action of spoilage organisms is scarcely retarded. In a strong brine such as is employed in the fermentation of salt pickles, containing about 10 per cent. of salt as a start and gradually increased in strength to about 15 per cent., all types of micro-organisms are greatly inhibited and the brine becomes practically sterile within a few weeks. In order to obtain the proper flavour, the fermentation of cabbage is carried out in a weak brine formed from its own juice, which is rapidly extracted by the action of the salt. The rapid acid formation in this brine, due to the growth of the lacto-bacilli, inhibits to a great extent the growth of all organisms which cannot grow without the presence of air or in the presence of acid.

The lacto-bacilli which cause this acid fermentation in the weak brine solutions are widely distributed in nature, and consist of a large number of species. They grow well in vegetable juices, more especially at a temperature of about 30° C. In northern cold countries the acid fermentation by these organisms is very slow.

The use of pure cultures as starters in the fermentation of brined products is not of great practical value; nevertheless, the use of a culture of properly selected organisms may be of value in improving the flavour of these products. When the brine reaches 7 to 8 per cent. of acidity the colon bacteria derived from the fæcal matter in the soil disappear, except on the surface of the brine where the mycoderma keep down the acidity. The organism usually present on the surface of pickle brine is a variety of *Mycoderma vini*, and is a naturally occurring soil organism. It ferments grape juice very slowly, but readily destroys lactic acid—being aided by mould growth. It is an aerobe.

Sometimes the fermentation goes wrong, develop-

ing an offensive odour, a musty taste, and a dirty brown colour. Such a bad fermentation may be caused by certain varieties of yeasts.

Olives may go wrong in the pickling solution, due to the growth of a gas-forming gram-negative bacillus, which produces gas blisters under the skin of the olives and causes them to float. Ten per cent. salt solution for twenty-four hours is necessary to kill this bacillus, but concentrations above 5 per cent. inhibit its growth.

To prevent the spoilage of pickles, therefore, the following methods should be adopted:

1. Thorough cleanliness in the factory and all the utensils used.
2. Thorough washing of the vegetables.
3. Discard all rotting vegetables and cut away all decayed spots.
4. Do not use too weak a brine in the preliminary pickling process.
5. After the proper flavour and acidity is produced by fermentation in the weak brine, add salt up to 15 per cent. to kill all the harmful bacteria.
6. Finally, pickle in boiled vinegar which has a good acetic acid content.
7. Cover the pickles with a sufficient amount of vinegar, otherwise moulds may grow on the surface of the solid vegetable ingredients exposed to the air.

National Mark Scheme for Canners

ON JUNE 4 last a scheme for applying the National Mark to English-grown canned fruits, peas, and beans was approved by the Minister of Agriculture. On that date, also, regulations prescribing grades and grade designation marks came into force. These regulations were made under The Agricultural Produce (Grading and Marking) Act, 1928, and refer to canned fruits, peas, and beans.

In its broad outline, the scheme is similar to other National Mark schemes already in operation. The grade designations are as follows:

Select dessert plums.
" strawberries.
" raspberries.
" blackcurrants.
" dessert gooseberries.
" apples.
" peas.
" beans.

In the case of plums, apples, and peas, the National Mark may only be applied to varieties known to be particularly suitable for canning. All fruits, other than apples, must be packed in syrups with a minimum percentage of sugar, and must be firm, ripe, free from blemishes, and reasonably uniform in size. "Select" apples must be packed solid, in slices of uniform size and colour, in cans of one gallon capacity. "Select" peas and beans are required to be freshly gathered at the time of canning and to be of uniform variety, size, and colour. None of the canned products under the scheme may be treated with preservatives or with artificial colouring agents other than those permitted in the present Public Health (Preservatives, etc., in Food) Regulations.

The National Mark is on the official labels to be affixed to the tins. The words "National Mark Canned Fruit—Select," or "National Mark Canned Peas—Select," or "National Mark Canned Beans—Select," also appear on the official labels. Authorised packers will receive these labels on payment from the Ministry of Agriculture and Fisheries. Under certain conditions, authorised packers will be allowed to use private brand labels incorporating the National Mark, instead of the official National Mark labels.

Whether applied in the form of an official label or as part of a private label, under the licence of the Minister, the affixing of the National Mark with a grade designation to a can of fruit, peas, or beans guarantees the quality of the contents.

Canners who undertake to comply with the procedure and conditions of the scheme apply direct to the Ministry for authority to affix the National Mark, and the Ministry refers their application to the National Mark Committee in the first instance. A Trade Committee consisting of growers, canners, distributors, etc., advises the National Mark Committee on the general administration of the scheme, and also with regard to any complaints regarding supplies packed under the National Mark.

Canned fruits from abroad, owing to the fact that they were early in the field, have a large market in this country, but many of the familiar English canned fruits are superior to them in delicacy of flavour. Similarly, canned peas and beans offer many advantages to the busy housewife, the English-grown varieties being undoubtedly superior to any obtained from abroad. It will be readily realised that the cumulative advertising value of the National Mark, and the guarantee of quality with which it is associated, ought quickly to establish a reputation for canned English fruit and vegetables and put their sale at the head of the Home Market.

Copies of Marketing Leaflet, No. 20, giving full particulars of this new scheme, may be obtained free of charge on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Acidity, pH and Food Manufacture

By L. E. CAMPBELL, M.Sc., Ph.D., F.I.C.,
Assistant Director, British Association of Research for the Cocoa, Chocolate, Sugar Confectionery, and Jam Trades.

PART II

Methods of Determination.

THERE ARE two methods of determining pH—the "electrical" and the "indicator." Of these, the former is really the fundamental one, and will, therefore, be described first, although it is by no means always the more convenient to use. All those interested in pH determinations should, however, know its principles.

The Electrical Method.

It has been stated that "pH" is one way of stating the concentration of hydrogen-ions in solutions, these hydrogen-ions being positively charged.

Now, when a metal, say copper, dips into a solution of one of its salts, say, copper sulphate, a "potential difference" or voltage exists between the two—*i.e.*, a sort of difference of electrical pressure. In the case of hydrogen-ions it is possible to cause platinum to be coated with hydrogen gas, so that it functions as a hydrogen "pole" or "electrode." When this dips into the solution containing hydrogen-ions, a voltage is also set up between the two *and this voltage depends on the hydrogen-ions present*. Therefore, if we can measure the voltage we can calculate the concentration of hydrogen-ions in the solution.

But in the first place, although it is easy to connect up the "hydrogen electrode" with the measuring apparatus, it is also necessary to connect up the liquid. This is done by means of the calomel electrode, which is a tube containing mercury at the bottom and over this a layer of calomel (mercurous chloride). The remainder of the tube, which has a narrow side-tube leading out from the upper portion and bent over so as to dip downwards, is filled with a solution of potassium-chloride saturated with calomel. This is a "half-cell," and the voltage given by it depends on the concentration of potassium-chloride in it—this may be tenth-normal, normal, or saturated. When the side-tube, which is full of potassium-chloride solution, dips into the solution containing hydrogen-ions and provided with the hydrogen electrode, we have a complete cell or battery, the platinum coated with hydrogen being connected with one terminal and the mercury with another.

This complete cell or battery, then, has a voltage which depends on the number of hydrogen-ions present, for the voltage due to the calomel-electrode half of the cell is constant and is known. Therefore, all we have to do in order to measure the concentration of hydrogen-ions is to find what this voltage is.

Now, we cannot measure it accurately by simply connecting up with a volt-meter, as this will introduce errors. We therefore balance this voltage against that obtained from an accumulator, cutting down this latter voltage until the two are equal.

This is done by means of a galvanometer, for when the two cells are connected up in opposition, and the voltage from the accumulator is cut down so as to be equal to that from the other cell, a galvanometer in the circuit will show no movement—*i.e.*, no current is passing in either direction.

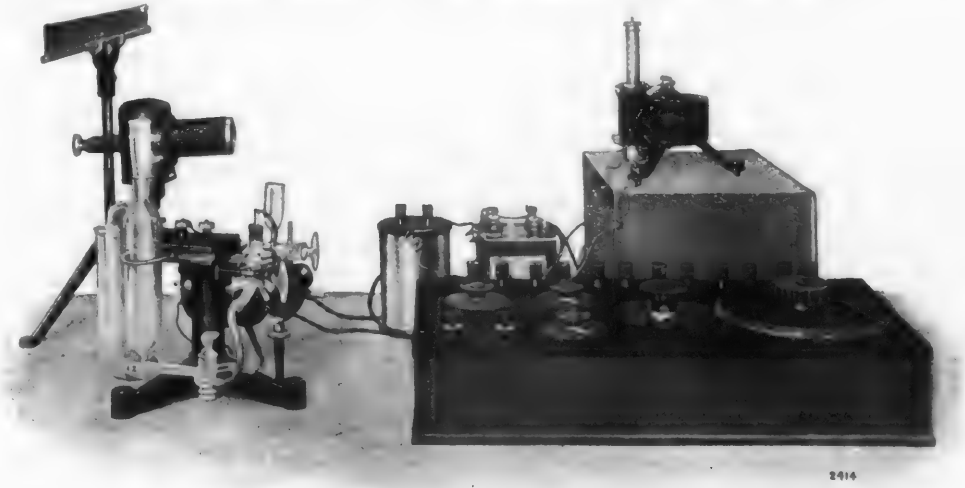


FIG. 1.

(Courtesy of The Cambridge Instrument Co., Ltd.)

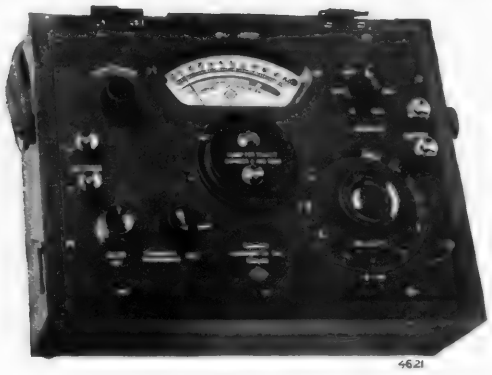


FIG. 2.

(Courtesy of The Cambridge Instrument Co., Ltd.)

Under these circumstances it is possible to measure what voltage from the accumulator is being employed to effect a balance, this being done by means of a Weston Standard Cell and a Potentiometer.

In Fig. 1 such an equipment is shown. On the left are the electrodes, which are, however, more complicated than those required for most work in connection with foodstuffs. Also on the left are the lamp and scale used in connection with the galvanometer, which is standing on a box at the back on the right-hand side. The light from the lamp is directed on to a small mirror attached to the suspended coil in the galvanometer and is reflected back on to the scale above the lamp. Any movement of the coil of the galvanometer is shown by a movement of the spot of light on the scale. The potentiometer itself is at the front right-hand side, and the standard cell and accumulator are at the back. Fig. 2 shows a self-contained portable potentiometer set, the galvanometer in this case being of the "pointer" type.

Before taking a reading the voltage from the accumulator is first cut down so as to be equal to that of the Weston Cell, which is constant. Then, by means of a switch, this voltage from the accumulator is opposed to that from the hydrogen electrode-calomel electrode combination and the correct dials dials of the potentiometer, operating the resistances, adjusted until the two voltages are equal. The voltage is then read off on the dials and is usually expressed in millivolts.

Where the hydrogen electrode is used, the pH is calculated from the formula—

$$pH = \frac{E - E_c}{0{\cdot}00019837\ T}$$

where E = Total Volts observed
E_c = Voltage of Calomel Electrode
T = Absolute Temperature.

The hydrogen-electrode consists of a piece of platinum (wire or foil) coated with "platinum black" (spongy platinum) over which hydrogen is bubbled. This electrode is, however, easily affected or "poisoned" by small traces of certain substances and, moreover, the "platinum black" requires renewing frequently. In addition, it will not give accurate readings in thick syrups or in jellies. The more recently devised "quinhydrone electrode" is more suitable for much work in connection with foodstuffs. Its action really depends on the fact that when quinhydrone is dissolved in water a certain amount of hydrogen is thereby made available. In this case the platinum is not covered with platinum black. It is merely necessary to keep it thoroughly clean and to heat it frequently to red heat in the flame of a spirit lamp. An excess of quinhydrone is mixed thoroughly with the sample, the electrode is inserted and the reading taken.

There is one objection to the quinhydrone electrode—it does not function in alkaline solutions. Where the quinhydrone electrode is used, the equation for the determination of pH differs from that given above. The quinhydrone electrode, unlike the hydrogen electrode, is "positive" to the calomel electrode. The connections with the potentiometer, therefore, have to be reversed.

The Indicator Method.

The indicator method depends on the fact that certain highly coloured organic chemicals change in colour according to the pH, so that if one is examining a solution which has itself little or no colour, one can drop a standard amount of one of these indicators into 10 cc. of solution, and determine the pH from the colour produced. This is done by comparing this colour with that given by the indicator in "buffer" solutions of known pH and finding one of the latter to match it.

The "buffer" solutions used in this method are certain mixtures which resist change in pH, and it is obvious that in the first instance their pH values had to be determined by means of the electrical method. Clark and others, however, have established standard "buffer" mixtures corresponding to definite pH values, and if the pure substance they recommend be used it is possible to carry out a con-

FIG. 3.

(Courtesy of The British Drug Houses, Ltd.)

(Continued on page 196.)

Sugar Inversion and other Phenomena in Jelly Making

G. M. COLE, R. E. COX, AND G. H. JOSEPH

The following paper gives some important results of an investigation carried out in the Research Department of the California Fruit Growers' Exchanges.

PART II

Some Common Errors in Jelly Making Practice.

JELLY FAILURES often result from "premature gelation," which may be of two kinds: one being due to the drop in temperature caused by adding the sugar in one portion to the acidified pectin solution so that a gel may form momentarily around some of the sugar particles and thus lessen the available jellifying power of the pectin; the other resulting from holding the complete batch at a pH suitable for gelation too long before pouring. This latter type of pre-gelation is the most disastrous and is undoubtedly the major factor which caused the failures reported by Fiedler, as will be shown by some data presented in a later portion of the present paper.

Various types of pectin have the ability to form jellies in the proper mixture of sugar-acid-pectin in certain definite times. This time-of-set may be only a fraction of a minute or may be several hours. If the jelly would normally set in 5 minutes and if it were boiled or otherwise agitated for 10 minutes with sufficient acid present, it is not difficult to understand why a failure would result, because once the gel formation has started and is hindered by ebullition, or by stirring, or by pouring, the framework necessary for a good jelly cannot form.

Aside from the natural inherent setting rate of a given pectin and within the range of acidities satisfactory for commercial jellies, such factors as the nature of the acid, the pH of the batch, temperature during cooling period, and the nature and concentration of sugar all affect the setting rate of the jelly. Of these factors, sugar concentration is most important. Since "premature gelation" depends upon the setting rate, and since the latter is greatly speeded up by a few per cent. increase in sugar concentration, it is to be expected that weakening or failure of jellies due to the premature-gelation phenomenon should become more apparent at higher sugar concentrations. This is precisely what Fiedler observed in varying his sugar concentrations from 50 to 70 per cent. in the jelly, and explained on the basis of increased inversion at higher sugar concentrations.

Premature gelation may be avoided in two manners: one by heating only to the boiling point and pouring quickly so as to shorten the time of contact between the acid, pectin, and sugar in the jelly kettle; the other and better way being the elimination of the acid from the cooking batch by placing the acid in the containers and pouring the jelly batch upon it.

Quite commonly the amount of pectin used is insufficient for the formation of good firm jellies. For instance, from the paper by Fiedler, it is evident that the pectin, stated as being of 160 grade, was used as though it were 250 grade.*

The Effects of Pre-Gelation and of Inversion on the Firmness and Texture of Pectin-Sucrose Jellies.

The following described experimental jelly batches serve to demonstrate the relative effects of premature-gelation and of sucrose inversion on the texture and firmness of standard sucrose-pectin jellies.

"160" grade citrus pectin from the same sample used in preparation of sucrose and of invert sugar jellies described earlier, and chosen as comparable to the material used by Fiedler, was employed. 2·7 g. of pectin, 432·0 g. of sucrose and 232·0 g. of water constituted each jelly batch, so that the pectin was used at exactly its proper grade of 160 and in 65 per cent. sugar concentration in the 664·0 g. finished batch, which is the concentration used in standardising this type of pectin. In each case 6 ml. of tartaric acid solution (373·6 g./litre of solution) were used for setting the batch, equivalent to 2 ml. of acid solution per 6 oz. jelly glass. The jellies were cooled at room temperature.

A summary of the data and results for the three jellies which were prepared is presented in Table II. on page 196.

The significant point illustrated by the data is that jelly No. 2 has suffered in no respect as a result of the acid inversion of sucrose which must have taken place during the 10-minute boil, while only a grainy syrup resulted in batch No. 3, due to pre-gelation which took place because of the 10-minute contact of all three components—*i.e.*, pectin, sugar and acid—before the batch was poured into the glasses. The normal setting time for jellies containing this pectin in 65 per cent. sugar concentration is 6 minutes.

It is apparent that the acidity and sugar concentration during the boil of batches 2 and 3 were identical within the possible experimental error and that the extents of inversion must therefore also have

* This is calculated as follows: In Fiedler's jelly containing 65 per cent. sugar there were used 26 grams of 1 per cent. pectin solution or the ratio of sugar to pectin is 65/0·26 or 250. For No. 160 pectin there should have been 100×65/160 or 40·7 grams of solution used.

been comparable. Whether a good jelly or a complete failure is to result depends upon conditions governing pre-gelation and not to any appreciable extent upon inversion of sucrose.

The above experiment has been carried out repeatedly, using various acidities, sugar concentrations, and pectins. Citrus and apple pectins, both liquid and dry, all behave similarly, and the extent of pre-gelation has been found to depend, first, upon the natural setting rate of the pectin employed, and, secondly, upon the sugar concentration and the pH value, inasmuch as these factors affect the rate of gelation.

Due to the absence of buffering materials in laboratory sugar and water jellies, pre-gelation is more apt to be encountered than when moderately acid and relatively highly buffered fruit juices are present.

Measures which may be employed to obviate premature gelation in commercial practice include working at lowered sugar concentrations, use of a relatively slow-setting pectin, shortening of the period of cook, addition of fruit juices as late as possible during the cook, and, as mentioned previously, the addition of the setting acid to the jelly container rather than during the cook whenever practicable.

From the foregoing it may be deduced that the usual troubles encountered in commercial preparation of glucose-syrup jellies, such as too rapid gelation, poor textured or weak jellies, which tend to exhibit syneresis after gelation, are in all probability due to the inherent and quite variable acidity of ordinary grades of glucose-syrup and are not to be attributed to the absence of sucrose.

TABLE II.

THE EFFECTS OF PRE-GELATION AND OF INVERSION ON THE FIRMNESS AND TEXTURE OF PECTIN-SUCROSE JELLIES.

Jelly Batch No.	*Method of Cook.*	*Time of Adding Acid.*	*Condition of Jellies after 24 Hours.*	
			Firmness	*Texture.*
1.	Only pectin and sugar present during heating period.	Acid solution placed in jelly glasses.	Good commercial firmness.	Resilient and smooth. No syneresis or weeping.
2.	Sugar and acid present during ten-minute boil. Pectin sol added at end of boil. (Note: Sugar inversion should be comparable to that referred to by Fiedler, but here no pectin present during inversion.)	Acid present during the entire cook.	Same as No. 1.	Same as No 1.
3.	Pectin, sugar, and acid boiled for ten minutes.* (Entirely comparable to Fiedler's method which produced poor jellies.)	Acid present during the entire cook.	Thin syrup only.	Liquid. Minute jelly grains apparent in the syrup.

* That the jelly grade of the pectin is not appreciably changed by this heat treatment with the acid has been known for some time and has again been confirmed by some of Fiedler's experiments.

(*Continued from page* 194.)

siderable amount of pH work without any electrical equipment at all. In addition, guaranteed buffer mixtures may, of course, be purchased.

The colours are best compared by looking through tubes held in a comparator such as that shown in Fig. 3. If the sample itself has a slight colour this may be allowed for by backing the tubes of buffer-containing indicator with other tubes containing only the solution under examination. The solution to be examined together with the indicator in it is then backed with a tube containing distilled water. In every case, therefore, we are looking through the same amount of liquid and the same amount of inherent colouring matter in the solution under examination. The additional colour effects of the indicator can therefore be estimated with some degree of accuracy.

Determination of pH may in many instances be carried out by using small capillary tubes and comparing the colours obtained with those of standards. A relatively large amount of indicator must be used in these cases, however, and although the dilution so produced is not significant in many instances, it does introduce a serious error in the case of concentrated sugar syrups.

It is not recommended, however, that the electrical equipment should be dispensed with. What is being pointed out is that for certain types of work a great deal of useful information may be obtained by means of the indicator method alone.

The theory of pH is, of course, not without its critics, and it may be admitted that in the earlier days of its history there was a tendency to attribute all the workings of nature to the hydrogen-ion.

Nevertheless, the basic fact remains that pH determinations do enable us to control operations in a way which is impossible by means of simple titrations for acidity or alkalinity, and there is little doubt that the possible applications of the method are not nearly exhausted.

Food Manufacturers' Accounts

A Series of Practical Articles on the whole Subject of Book-keeping as Applied to the Food Industry

By S. HOWARD WITHEY, F.C.I., ETC.,
Accountant and Auditor. Author of "Converting Into a Limited Company," "The Book-Keeper's Vade-Mecum," "Banking," etc.

PART I

A FEW years ago it was customary for the manufacturer of foodstuffs, preserved meat, fish, vegetables, jams, etc., to ascertain his financial position in relation to the business and to the outside world by referring to his bank pass-book. After making a more or less accurate allowance for his outlay in the form of machines, apparatus, tanks, stills, pans, etc., the amount by which the bank balance at the close of the working year or period exceeded the balance at the commencement was supposed to represent the amount of net profit realised.

The Importance of Book-keeping.

However reliable this method may have been at one time, it is no longer available to the food producer. Side by side with increased efficiency in such important matters as grinding, blending, clarification, and the handling of materials, the food preparing equipment at the command of the manufacturer is much more varied in character, while enormous and far-reaching developments have taken place in the world's banking and commercial credit systems. New methods have ensured quicker returns; science and engineering have conformed to most of the requirements in the matter of hygiene, with the result that competition in the food industry has become acute, and is not always fair. In modern business transactions credit plays a very important part, and in order to be in a position to ascertain the amount of profit made under each heading, or the extent of the loss sustained, appropriate book-keeping methods have to be instituted, and a suitable system of internal check and control set up.

The need for a good accounting system is really of a threefold nature—that is to say, it is personal, commercial, and legal. Apart from the personal satisfaction that up-to-date methods afford, the food manufacturer and the fruit canner, the wholesaler and the retailer, must be able to ascertain all and any information that may be required, and must guard against errors and irregularities which too frequently culminate in disaster. The ability to prepare financial statements is of enormous value, and the success of the business will be practically impossible unless all pecuniary and trade transactions are not only recorded in a proper manner, but are tabulated in a form easy to understand. Moreover, no food producer or distributor desires to pay more tax than his fair share, but as matters stand at the present time many are compelled, in their own interests, to seek a greater or lesser degree of professional or legal assistance—and often both—in the compilation of accounts showing their tax liabilities. The adoption of correct accounting methods will enable such expenses to be substantially reduced, and in some cases avoided altogether.

Some Principal Questions..

Some of the principal questions that are constantly asked by the seller of food products in relation to the business may be enumerated as follows:

1. Do the orders on hand at the present time compare favourably with previous years or periods?
2. Am I carrying sufficient stock under each heading, or should certain lines be developed or suppressed?
3. What was the total of my cash sales last month, or to date, and under what headings did they fall?
4. What do the credit sales amount to, and how much is owing to me by customers and debtors?
5. Are all essences, chemicals, salts, pectin, colours, acids, corks, and other materials and stores properly accounted for, or is there a loophole in the system of control?
6. What was the total cost of my purchases last month, or for any other period, and is any other classification of the transactions desirable?
7. Of what do my management, selling, and working expenses consist, and under what headings could economies be safely effected?
8. What is the total of my capital outlay to date, and how is the figure made up?
9. How much do I owe to trade creditors and suppliers at the present time, and am I taking full advantage of discounts allowed for prompt payment?
10. Am I making adequate allowance to cover the depreciation of hot-water and cooling installations, conveyors, separators, mixers, box making plant, laboratory apparatus, etc., due to wear and tear, obsolescence, etc.?
11. Does the percentage of net profit compare favourably with previous years or periods when considered in relation to the turnover and to the invested capital, or are any branches or departments of the business being carried on at a loss, and, if so, why?
12. What is the present value of my business assets employed for profit-earning purposes, and what is the total and the composition of my liabilities?

The Need for Double Entry.

In order to be in a position to answer these and other equally important questions, it will be neces-

sary to keep a number of subsidiary books, or books of original entry, in addition to the ledgers. Each item recorded in a subsidiary book will have to be posted to its proper account kept in one of the ledgers, and the need for this double entry arises from the fact that every business transaction has two sides—a receiving side and a giving side, or a debit side and a credit side.

For example, when foodstuffs of any kind or description are sold to a customer for immediate cash, the seller's stock is reduced and his cash or bank balance is increased. To record only one side of the transaction would obviously not be correct, for, in addition to entering the cash on the debit or receipts side of the cash book, the sales or stock account would have to be credited with a like amount. In the same manner, food sold on credit, although reducing the manufacturer's stock, will increase the book debts, and, consequently, the selling prices should be recorded on the credit side of the goods or stock account, and also on the debit side of the particular personal accounts kept in the sales' or customers' ledger. The same principles will apply to every conceivable business transaction without exception.

The fact that for every debit entry made in one book or account there will exist a corresponding credit entry in another book or account, and *vice versa*, will enable the clerical accuracy of the entire book-keeping to be verified, for the total of all the debit items in the set of books should exactly correspond with the total of all the credit items. Whether this is so or not will be proved by making out a list of all debit and credit balances outstanding, usually referred to as a trial balance, and these figures will be tabulated at stocktaking time to constitute a trading account, a profit and loss account, and a balance sheet exhibiting a true and correct view of the state of the food manufacturer's affairs on a given date.

Division of Ledger Accounts.

The ledger accounts will consist of both personal accounts and impersonal accounts. The former will comprise the various customers' and debtors' accounts kept in the sales ledger, and the accounts of creditors and trade suppliers kept in the purchases or bought ledger. The impersonal accounts will be of two kinds—viz., the accounts of management and working expenses, and those of assets and liabilities. Such important information as the totals of the sales and the purchases under each heading, the nature of the expenses incurred, the sources of all the profits, the cause or causes of any losses, and the amount of the real capital or the extent of the deficiency, cannot be ascertained with any degree of accuracy unless double entry methods are employed.

It cannot be too strongly emphasised that the great advances made within recent years in the study of food preserving processes, and the consequent subdivision of operations due to specialisation, necessitate the keeping of proper books of account. That many manufacturers and distributors of food products do actually neglect the financial side of the business is proved by an examination of the bankruptcy files for the past ten years. Instead of being due to any inherent weakness of the individual concerns, a very considerable proportion of recent failures in the food industry is the direct result of failure or inability to adopt suitable book-keeping methods, and in these articles it is proposed to avoid both the use of technical terms and the theory of the subject, but to concentrate on all practical requirements in the matter of up-to-date accounting methods. The food industry will be considered to consist of concerns engaged in the manufacture of edible commodities, fruit canners, millers, caterers, etc.; wholesale businesses supplying retail shops as well as their own customers; concerns confining their activities to supplying branches; and also retail businesses engaged in satisfying the needs of private customers in the matter of food of all kinds.

The next instalment of this series will describe the different books of account which experience has proved to be necessary in the case of the food manufacturer, and will show the value of advertising and publicity to producer and distributor alike.

(To be continued.)

The Cold Storage of Fruit

(Kidd, "New Zealand Journal of Science and Technology," 1928, Vol. 10, pp. 80-90.)

The author refers to the application of scientific research to New Zealand industry in regard to the storage, handling, and transport of fruit, and includes some reference to the cold storage of meat in the same connection. The report is based upon the observations of the author during a tour of New Zealand.

The question of the depreciation of the fruit between the time it leaves the store and the time it reaches the consumer has been studied, particularly in regard to humidity, air movement, and ventilation. Air movement and humidity affect the evaporation of water from the fruit and its consequent wilting and shrivelling, together with loss in weight and value. The greater the air movement and the drier the air the faster the loss in it occurs, and the quicker wilting and shrivelling develop. Fruit should not be allowed to lose more than 5 per cent. of its moisture by evaporation during the whole period of its storage, and the air movement and humidity should be adjusted to this end.

* * *

Some Organic Acids of Sugar-Cane Molasses. E. K. Nelson.

An investigation was made of the volatile and non-volatile acids of sugar-cane molasses, with the exception of the amino-acids and the non-crystallisable acids approaching humic acid in character. The acids of molasses were found to be formic acid, about 0·1 per cent.; acetic acid, 0·2 per cent.; aconitic acid, 0·8 per cent.; lactic acid, 0·5 per cent.; and small amounts of malic and citric acids.

The Problem of Refuse Disposal

By J. N. WILLIAMS, F.C.S., A.M.I.Mech.E.

The author of this article gives sound reasons why Food Manufacturers should investigate the possibilities of using their waste products as fuel for power generation. —"Good riddance of bad rubbish!"

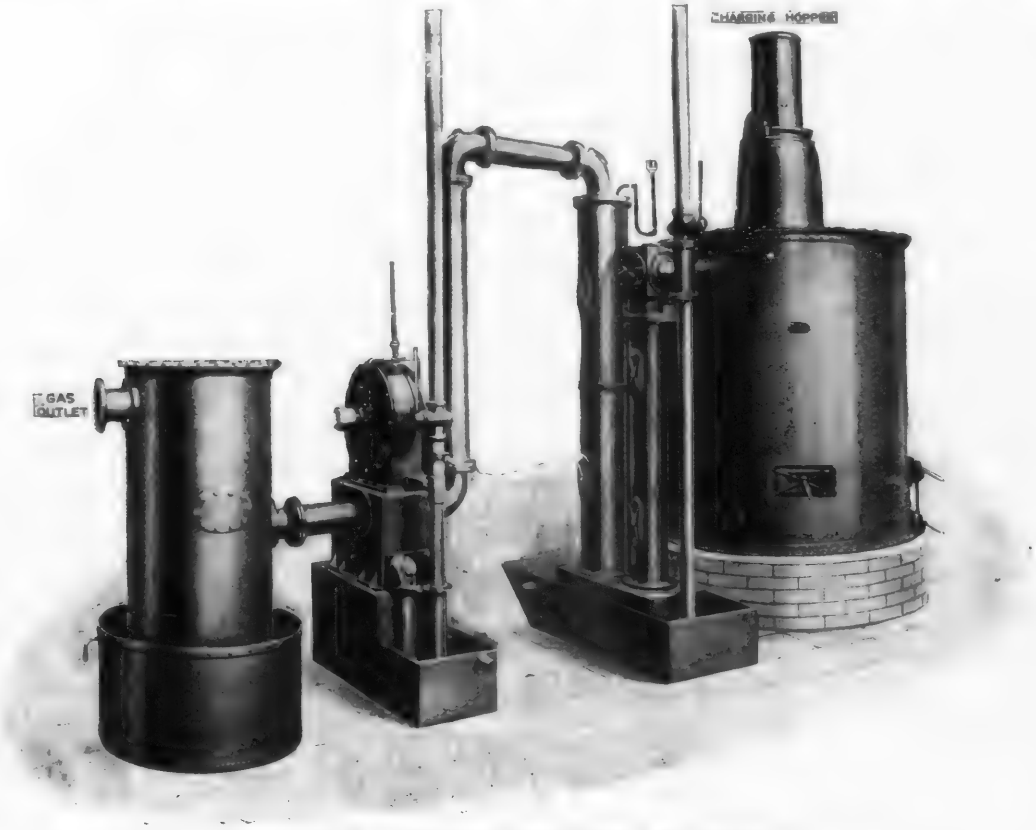
THERE IS one problem confronting food manufacturing concerns which, so far as the writer is aware, has received very inadequate attention. Most food manufacturing processes involve waste—the rejection of constituents which are unsuitable for human consumption, such as peelings, cores, pulps, animal tissue, or bones. Then there are frequent problems connected with the disposal of wood chips, paper, and sawdust from packing cases, or the removal of matter which has become putrid.

The methods employed to dispose of this refuse are varied and depend upon a number of factors. Certain classes of refuse may be passed on to other manufacturers for by-product recovery, and may thus be regarded as having a market value. In general, the waste matter has no value, and continuous expense is incurred in its removal as trade refuse.

Destructor furnaces are sometimes employed in which the refuse is incinerated; in some cases combustion is supported by means of coal or oil. Where the main power requirement is carried by steam boilers the refuse is often destroyed by firing it on the boiler grates.

There can be no question that the attitude adopted in most cases is that the refuse is a nuisance, that its disposal is to be effected in the cheapest manner possible, for any expenditure in this direction is a dead loss.

Yet this point of view is unwarranted, for the refuse is invariably carbonaceous, and is thus good fuel for power purposes. In that case, it may be



Photograph of a "Whitfield" Patent Refuse Gas Producer.

This gas producer uses ordinary vegetable refuse to drive the "National" gas engine in a Midland engineering works.

asked, why is this refuse not more widely used for power generation? The answer is that the moisture content of most vegetable refuse is high, and that if attempts are made to burn it in single stage combustion—*i.e.*, on the grate of a steam boiler, or in a destructor—the moisture present so damps combustion as to render the products of combustion practically valueless. It is a sheer waste of time and money to try to obtain power from refuse through the medium of steam. No useful purpose is served in trying to improve this damped combustion by the supplementary use of coal or oil, for the refuse moisture still goes forward with the products of combustion.

Refuse for Steam Raising.

As indicating how hopeless is the attempt to use refuse for direct steam raising, the following may be interesting. Take the case of *dry* untreated refuse containing, say, 30 per cent. moisture. Now, if such refuse is fired in a steam boiler some 1 to 1½ lbs. of steam will be generated per pound of refuse. Good steam practice calls for some 20 lbs. of steam per B.H.P. Thus 15 to 20 lbs. of refuse would have to be handled per B.H.P.

But the calorific value of such refuse would be about 4,000 B.Th.Us. per pound, and, as it is common practice to obtain a B.H.P. for 10,000 B.Th.Us., it should thus not be unreasonable to expect the combustion of 3 lbs. of refuse per B.H.P.

How can it be profitable to handle 15 to 20 lbs. of refuse to obtain a B.H.P. via a steam installation when the same power should be developed for 3 lbs. of refuse, or, alternatively, six to seven times as much power from the same quantity of refuse?

Thus, the question is how to unlock the carbonaceous element in the refuse and to avoid the damping action of the moisture.

Attempts to dry-off the refuse by the direct use of fuel may be ruled out on account of costs, the cost of the drying plant and the continuous cost of coal or oil for the drying process.

Gasification of Refuse.

Now, here is a very definite solution to the problem; feed the refuse into a hopper of a gas producer, gasify the refuse, cool the gas, and thus condense the moisture out.

If it is done properly the result is a good quality producer gas having a calorific value of 120 B.Th.Us. nett, which is suitable for a gas engine or any other heat process work. The quantity of ash remaining will be some 1½ to 5 per cent. of the refuse used.

Trade refuse varies over such wide limits that it is difficult to give the quantity of power which may be obtained from a given quantity of refuse. A brake-horse-power per hour should be developed for from 2 to 4½ lbs. of refuse, containing 30 per cent. to 60 per cent. moisture.

As typifying what may be done in this direction,

Gas Engine Indicator Diagram taken when using Town Gas.

Gas Engine Indicator Diagram taken when using Producer Gas made from Vegetable Refuse.

These two diagrams were taken on the same engine, under identical conditions and within five minutes of each other.

it may be interesting to take representative classes of refuse: vegetable matter, fruit pulp, and sawdust. These, undried, will be constituted roughly as follows:

	Moisture.	*Volatiles.*	*Fixed Carbon.*	*Ash.*	*Lbs. of Refuse (wet basis) per B.H.P. Hour.*
Vegetable Matter (undried) ..	Per cent. 73·18	Per cent. 17·2	Per cent. 8·3	Per cent. 1·32	5·5 to 6
Putrid fruit ..	75·9	18 1	5·49	0·51	6 to 6·5
Pressed fruit pulp	79·4	14·7	5·1	0·8	7 to 8
Sawdust ..	18·0	54·0	24·8	3·2	1½ to 2

Most organic matter holding 60 to 70 per cent. of moisture may be used for gasification without preliminary treatment. Higher moisture contents present a difficulty, as the carbon element may be too low to supply sufficient heat to deal with the moisture. In these cases alternative treatments are offered, the choice being dependent upon the actual proportion of moisture or its form.

Where the moisture content is high and the water free, it is desirable to keep the refuse on a draining screen for 24 hours, so that the free water may be allowed to run off. The reduction of the moisture content by so small an amount as 5 per cent. is well worth achieving, for the ratio of combustible to moisture may be 1 : 9·2 when the moisture content is 90 per cent., but reduce this moisture content to 85 per cent. and the ratio becomes 1 : 5·8.

If there is insufficient free moisture to render draining storage advisable, then a drier refuse containing, say, 20 per cent. to 40 per cent. moisture may be mixed with the wet refuse. Sawdust, wooden boxes, or paper would be quite suitable. Or, again, if the gas is to be used for an I.C. engine, the

use of exhaust should result in the recovery of over 2,000 B.Th.Us. per I.H.P. of the engine on full load, which heat may be used for drying the refuse.

There may be other sources of waste heat, such as steam boiler flues or exhaust steam.

Each pound of fixed carbon when burned to CO_2 liberates 14,600 B.Th.Us., and only 10,200 B.Th.Us. are required to reduce the CO_2 to CO (producer gas), so that 4,400 B.Th.Us. of heat generated per lb. of carbon are found as sensible heat in the temperature of the CO. A large proportion of these 4,400 B.Th.Us. may be used to drive off the moisture. The evaporation of 1 lb. of moisture absorbs about 1,000 B.Th.Us. Thus the reduction of the CO_2 from 1 lb. of carbon to CO. will leave sufficient heat to drive off some 4 lbs. of moisture. The balance of the moisture is removed in this way: Owing to the low temperature at which the gasification takes place, the temperature of the gas as it leaves the producer—*i.e.*, before cooling—should not exceed 100° C. This means that the temperature of the green fuel in the higher levels of the producer will be about 100° C. The volatiles, in passing through this cold fuel, are condensed, and as the fuel passes down into the hotter zone are redistilled and recondensed. This is a continuous process, which results in the lighter constituents of the volatiles going forward as an enrichment to the producer gas, the heavier constituents, mainly carbon, remaining to pass down into the reduction or combustion zone.

Thus the amount of fixed carbon in the fuel is supplemented through the carbon constituent of the volatiles. This fixation of carbon introduces an additional 4,400 B.Th.Us. per lb., and it is found in actual practice that refuse holding 70 per cent. moisture may be gasified with complete success.

An interesting sidelight on this low temperature process is the fact that weeks of continuous running should not result in a pound of tar in the tar extractor!

The fact of the lighter constituents from the volatiles going forward with the producer gas results in a rich gas. Frequently, higher calorific values have been determined in gas made from such refuse than are associated with the gas generated from the more customary fuels.

These are days of high fuel costs and trade depression, yet manufacturers are buying fuel and actually paying for carbonaceous matter to be carted away or destroyed. Expensive fuels are used inefficiently, while low-grade fuels which might give much better results are thrown to waste. Sawdust is an exceedingly good fuel, yet it is frequently handled by most inefficient methods. The cost of process heating and power generation are such serious matters that any effort to use refuse or low-grade fuels will result in a handsome return.

Canned Foods

MR. C. E. GILL discussed the advantages and dangers of canned and bottled preserved foods before the Plymouth Rotary Club on October 12, 1929. On a rough estimate, he said, about 5,000,000 cwt. of canned goods were imported into this country in 1927, and about 130,000 cwt. of canned goods manufactured here were exported.

The prevailing view, both scientific and popular, in regard to canned foods was that they were types of preserved foods which remained sound because the food was rendered sterile by heat and maintained in that condition by being hermetically sealed. When canned foods became unsound the explanation offered was either that the sterilisation was inadequate or that the continuity of the tin was defective, admitting bacteria from the outside air, which decomposed the food. A detailed examination of perfectly sound samples had shown, however, that about 40 per cent. were not sterile. The percentage varied from 18 per cent. in unsweetened milk to 84 per cent. in fish and 100 per cent. in sweetened milk. In relation to food-poisoning outbreaks, canned foods took their share, but not an undue share, as vehicles of infection. The development of poisonous substances was accompanied by a gas formation, which tended to bulge the tins, giving rise to "blown" tins which acted as danger signals. On the whole, there was little evidence that tainted food was poisonous, as it was only in the last stage of putrefaction, when the food was far too nasty to be eaten, that poisonous products were formed. The danger of poisoning from tinned foods lay in the solution of the tin by the food contents. Fruit, meat extracts, and some fish foods were all liable to contain considerable amounts of tin. Tin, however, was unimportant as a cause of illness unless very old tinned goods were sold. The general conclusion was that while tinned goods had definite and special risks, they were not large risks, and were for the most part easily guarded against. The only chemical danger with glass containers lay in the presence of glass fragments. Cheap glass jars often contained air bubbles which broke down when the jar was filled with a hot liquid. A Ministry of Health report stated that "glass jars were not regarded as objectionable," but Mr. Gill said he was not prepared to endorse that opinion.

Enquiries

ENQUIRY NO. 104.—*Please advise me as to how mould can be prevented from forming on lemon curd. The mildew forms under the wax tissues, and when a small air pocket is formed, owing to the tissue not being pressed down on the curd, the mildew develops rapidly. The lemon curd is of a fairly stiff consistency, and is stored in a dry place at about 58 to 60° F., yet the mildew develops after only one month in stock.*

REPLY.—Moulds get into the lemon curd from the air and dust; therefore, the room in which the curd is prepared should be thoroughly cleaned out with soap and water. Sometimes walls and ceiling are brushed over with a weak solution of copper sulphate.

The vessels in which the lemon curd is placed should be thoroughly cleaned out with hot water or steam. Moulds will not grow if the air is excluded, so the wax tissues should be placed in close apposition to the surface of the curd. If the quantity of acid in the preparation is increased, this will also help to inhibit the moulds.

The correspondent replied to these remarks as follows: *Many thanks for your letter* re *mould on Lemon Curd. I feel sure that the utensils, etc., in this factory are perfectly clean. With regard to tissues being placed close to the surface of the curd, in each case of mould formation, when the tissue had been placed on the curd and a parchment top used, the mould was found under a small air pocket between curd and tissue. Other jars filled from the same batch under the same conditions were in sound condition. No improvement was obtained by using metal cap and 15-in. vacuum. I have not yet found the ideal metal cap for lemon curd. When the tissues are put on whilst curd is hot and the parchment cap put on the next day, all are in sound condition. I would much appreciate any further comments you may care to make.*

COMMENTS ON THE ABOVE.—Mould spores usually gain access to foods from the air. They only grow in the presence of air, and that is why they are more likely to develop in air pockets where the tissue is not in close apposition to the lemon curd.

In order to stop the trouble we advise the following procedure: Fill the bottles with the lemon curd when it is hot, apply the tissue at once, and immediately seal the bottles with the caps whilst the material is still hot. Mould spores are easily killed by heat.

ENQUIRY NO. 105.—*Can you recommend a preservative which will keep bottled milk-soda in good condition (in India) for at least seven days? As soon as we aerate the milk in the machine, coagulation occurs.*

REPLY.—The separation of the milk is due to acid formation, usually lactic acid, which is formed by the action of bacteria on the milk sugar. If there is a certain amount of lactic acid in the milk the further addition of carbonic acid in the soda-water may bring about the coagulation.

We would advise pasteurising the milk as soon as it is obtained from the dairy, in order to kill the bulk of the fermenting bacteria. A small trace of bicarbonate of soda will also help to neutralise the acid and thereby prevent coagulation.

ENQUIRY NO. 110.—*What is the best method to adopt to prevent fermentation in pickles?*

REPLY.—The fermentation in pickles is likely to be due to certain vinegar bacteria or to a yeast organism. Some yeasts will grow in 1·32 per cent. of acetic acid, 19·2 per cent. of sugar, and 3·6 per cent. of salt. Some of the vinegar bacteria can withstand 4·5 per cent. acetic acid.

The bacteria causing the fermentation may be present in the vinegar or in the material composing the pickles. Boiling the vinegar and pouring over the pickles would help to destroy these bacteria. The addition of sugar and salt helps to inhibit the bacteria, and so prevents fermentation.

In the case of brine pickles, fermentation will be prevented by increasing the strength of the brine; for example, one pound of salt to ten pounds of cucumbers is necessary to aid in checking fermenting bacteria.

ENQUIRY NO. 112.—*A correspondent gives us a list of ingredients he is using in the manufacture of lemon cheese, but notes that, although the product is all that can be desired in the matter of appearance and flavour, if the jar stands for a few weeks the cheese forms a cylindrical mass surrounded by liquid.*

REPLY.—The trouble you are having with the lemon cheese, whereby the liquid separates out on standing, may be prevented by adding to the product gum tragacanth. Some food experts consider gum tragacanth to be an undesirable ingredient, but allow starch up to 10 or 15 per cent. The starch has the same effect as tragacanth in preventing the separation of the fluid and solid constituents of the product.

If tragacanth is used—*e.g.*, "tragon"—only a small quantity is required. It is used by many manufacturers.

113. We shall be pleased if you could supply us with the name of a French machine for cleaning and washing plums, gooseberries, and damsons. Also the name of the firm making an improved paring and coring machine.

114. Can you put me in touch with someone who has a good Victoria gooseberry snuffing machine for sale?

115. Required advice on making jellies from whole fruit.

116. Can you furnish us with the addresses of manufacturers of fibre or composition used by manufacturers of bottle filling apparatus to ensure that the apparatus is air and water tight?

Companies Act, 1929

A VERY important Act of Parliament to all business interests recently became operative. This—the Companies Act, 1929—brings up to date the 1908 Act, and also the Acts of 1913, 1917, and 1928, the latter Act all new law, which came into force with the Act under review. This Act comprises 385 Sections and 12 Schedules, and contains some very novel and important provisions. Founded on the Greene Committee's report, the underlying idea has been to tighten up regulations, to safeguard the investor whose daily business does not lie in the realms of finance, and makes for a more rigorous supervision of directors, officers, secretaries, and liquidators.

Prospectuses.

It is provided that more information shall be divulged in prospectuses, one very important provision being that now particulars of "minimum subscription," upon which the directors can proceed to allotment, must be given. Formerly, a merely nominal figure was stated—a favourite figure being seven shares—so that many companies commenced business with insufficient capital, the issue being very much undersubscribed. Under this Act the amount to be raised must be sufficient to cover the following matters, before the directors can go to allotment. Failing to secure this, moneys must be returned to applicants for shares within forty days of the date of issue of the prospectus. The issue must secure sufficient for preliminary expenses, commissions, the purchase price of any business or property acquired or about to be purchased, and the repayment of any moneys borrowed for any of the foregoing matters, and the amount stated as required for working capital.

It is now made compulsory for such items as profits, former dividends (if any), auditors' reports, and report of a firm of *accountants*, as regards any business purchased or about to be purchased, detailing each year for the preceding three years, to be stated. If any business concerned in the flotation has been in existence for less than three years, its period of life must be stated.

Form of Application for Shares.

No form of application for shares must now be issued unless a prospectus containing all the provisions of the Act is issued at the same time. This is considered very important as default fine is anything up to £500. Exceptions to these provisions are legitimate underwriting agreements, or for shares not offered to the public. It is doubtless known that no prospectus can be issued until a copy has been delivered to the registrar of companies and certain provisions carried out.

Offers for Sale.

To avoid the issue of a prospectus, and so escape the many particulars to be included therein, a practice had arisen of allotting to an existing company all, or most, of the shares of a flotation, and the company concerned has made what is styled an "Offer for sale" to the public. This is now made unlawful, unless the document issued in lieu of prospectus contains all the entries required in a prospectus, and all regulations and penalties applying to a prospectus apply to this document also. In addition, the amount of the consideration received or about to be received by the company as regards the shares to which the offer relates must be stated, and any contract concerned in the allotment must be open to inspection by the public, and place and time for such inspection must appear in the document likewise.

Directors and Management.

More stringent regulations have been made *re* directors and any loss caused to shareholders through negligence or breach of trust. It has been provided in some articles that no liability obtained unless *wilful* negligence is proved. This Act voids all such clauses of contracting out against neglect, and such an indemnifying clause is now no defence to any action for loss or damage sustained by shareholders, and this applies to directors and any officers of the company. An undischarged bankrupt, unless acting before August 3, 1928, and continuously acting as such since, cannot be employed as a director or take any part in the management of a company, unless by permission of the court which made the person bankrupt.

If the official receiver in a case of "winding up" reports that a director or officer of a company has been guilty of fraud, the court can order such a person not to act as a director for a certain period, such not to exceed five years.

Another most important new provision is in respect of payments to directors as compensation for loss of office on transfer of a company. It is now declared unlawful for such payments to be made, unless particulars of the amount involved have been sent to all members in the notice informing shareholders of the offer for shares made, and such payment approved.

Accounts.

It is now made compulsory for proper books of accounts to be kept. Also very stringent new law applies to the making of balance-sheets, and the giving of fuller particulars to shareholders. Profit and loss accounts and balance-sheets, with auditors' reports, must be laid before the company in general meeting, and various particulars, in addition, posted to each member likewise. The balance-sheet must have attached to it the directors' report, with intended dividend and amount to reserve fund. There

must also be included a statement of the authorised and issued share capital, assets and liabilities, with sufficient information to disclose the nature of the latter two items, and to distinguish between fixed and floating assets, and it shall state how the values of the fixed assets have been arrived at.

Extra regulations have been issued in relation to "holding companies." In future details must be given as regards subsidiary companies, profits and losses, assets and liabilities, and it must be stated how losses of the subsidiary companies (if any) have been dealt with, and in which companies' accounts, and so on. A subsidiary company is defined as one in which the holding company holds more than 50 per cent. of the shares or voting power, or has power to appoint the majority of the other company's directors.

"Share Pushing."

Although already in force—the only section to come into operation with the passing of the 1928 Act on August 3, 1928—a very important provision is the restrictions on house-to-house offering of shares for sale. This is illegal, as is also an offer of shares in writing to a member of the public unless various conditions are carried out, such as a statement issued containing various particulars prescribed in the Act. This section does not apply as to offers in writing, if the shares offered are quoted on a recognised Stock Exchange in Great Britain; are shares concerned in an "Offer for sale," already explained, or the person making the offer regularly does share business with the person to whom the offer is made. This is the system which has become colloquially known as "share pushing."

Various.

Altered meanings are now given to special and other resolutions, and a resolution passed at an adjourned meeting now dates from date of passing, and not date of introduction at original meeting.

Underwriters' commissions cannot now be more than 10 per cent. This will put a curb on many unsound flotations, where such commissions have been proved to be as much as 50 per cent. Of course, legitimate underwriting is a very important and useful branch of company business, although with most sound companies 3 per cent. or thereabouts is the usual commission.

A very useful innovation is the power to issue redeemable preference shares, on certain conditions, and to reissue redeemed debentures.

More stringent regulations are introduced as to the keeping of registers of members and directors, and particulars to be entered therein. These registers must be available for inspection at certain hours of the day at the registered offices of the company.

Considering the great number of private companies now operating, it should be noted that if a private company alters its articles from those which make it a private company, it automatically ceases to be a private one, and forfeits the privileges attached to a private one as to delivery of certain documents. It shall then deliver to the registrar a prospectus or statement in lieu thereof, as prescribed in the Act, and be subject to all rules appertaining to public companies. This also applies if it defaults in provisions likewise, with further penalties in addition.

Shares may now be issued at a discount of a class already issued, but only if authorised by special resolution, passed in general meeting, and by sanction of the court. The issue, moreover, cannot take place until one year has elapsed since the date upon which the company was entitled to commence business.

If the memorandum of association is altered after a person has become a member, and such alteration requires him to subscribe for a greater number of shares than he has contracted for, he is not bound by said alteration, unless he has agreed either before or after to be bound by such alteration increasing his liability.

Most considered opinion is agreed that this Act should go a long way to prevent abuses of company law, and that it will generally be accepted by companies as an excellent addition to previous law. It has aimed at correcting such irregularities as are likely to arise from too little disclosure to shareholders and potential shareholders and the possibilities of fraud, and in doing so has introduced added restrictions and regulations which should not prove irksome to legitimate business.

After all, it is not by law that crime can be prevented, although it can be made more difficult to practise; always first and last it is the high standard of those engaged in business generally which makes for the excellence of commercial life, and company law and practice in many ways meet the needs of the public in a highly satisfactory manner.

It might be of interest to mention that it is estimated that 115,000 companies will be subject to this new Act—the number on December 31, 1924, being in the region of 91,000.

Milk Sterilisation

A PROCESS developed by George Grindrod, of Wisconsin, for the sterilisation of milk, in which active spores are absent, and there is little or no change in the flavour, has just been made public. The milk is placed in a nearly closed chamber and subjected to the direct impact of multiple jets of steam arranged at the bottom of the chamber. The steam leaves the chamber with a drop in pressure of about 40 per cent, and subjects, in a very short time, all the particles of the liquid to the direct impact of the steam. The temperature of the milk is now reduced as rapidly as possible by evaporation to a point where changes of flavour or other chemical changes will cease. In the product it is found that the globulin and albumin are adsorbed partly upon the fat and partly redispersed in new colloidal form. This is claimed to give greater resistance to coagulation.

Trade News

Lecithin.

Another informative publication has recently come to our notice. This has been issued by Fredk. Boehm, Ltd., and gives an extremely useful and interesting account of the nature, properties, and uses of lecithin in chocolate making.

* * *

Instruments.

The Drayton Regulator and Instrument Co., Ltd., have sent us leaflets giving particulars of their Room Type Temperature Recorder and their Balanced Pressure Railway Steam Trap.

* * *

A New Synthetic Coffee Aroma.

Messrs. Haarmann and Reimer, of Holzminden, Germany (manufacturers of "Bourbonal"), have just placed on the market a new Synthetic Coffee Aroma (under the registered name of "Coffarom"). Samples and supplies can be obtained from T. Harrison and Co., Willesden, London.

* * *

Air Filters and Dust Collectors.

A simple, yet extremely efficient, form of filter for removing particles of dust from the air of factories, offices, and other buildings is the "Visco" Air Filter made by the Visco Engineering Co., Ltd., London. This is the pioneer filter using oil-film covered surfaces for air purification. By means of a special arrangement, the destruction of bacteria in the air being filtered can be effected.

Another speciality of this firm is the Visco-Beth Dust Collector. This is largely used in flour mills, milk-powder factories, and other factories where the collection of fine powders comes into question.

* * *

Filters and Mixers.

A Centrifugal Filter, made by Lang, Ltd., of London, is largely used for clarifying fruit juices and other liquids by removal of suspended matter in extremely finely divided, or even colloidal, condition by a combine process of centrifuging and filtering.

The same firm makes a useful type of mixer, which is claimed to crush, disintegrate, dissolve, emulsify, and mix in a fraction of the time usually employed for these processes. It is applicable in the chocolate, sweets, jam, confectionery, and a variety of other food manufacturing industries.

* * *

Air Purification.

The firm of Robert Morton and Co., Ltd., of Burton-on-Trent, has for a number of years made an air purifier which has met with considerable success in the brewing industry. Essentially it consists of a cast-iron circular case, fitted with a number of trays, over which the germ-absorbing medium is caused to flow, thus always exposing fresh surfaces to the air which passes to and fro between the centres and outsides of the trays. It is invaluable in connection with the supply of air to yeast storage rooms. This firm is willing to give advice without charge and to demonstrate the plant in actual operation.

Control Instruments.

We have received a booklet containing useful particulars of the Zeiss Industrial Refractometers. These instruments are invaluable for control purposes in the jam, sugar, and related industries.

* * *

Canada.

The Southam Newspapers of Canada have issued an interesting booklet illustrating by means of advertisements the growth during the past sixty years of six Canadian cities. A point is made of the fact that Canada offers to British manufacturers an unsurpassed opportunity for trade development, and it is stated that the services of this newspaper organisation are always freely at the disposal of interested parties.

* * *

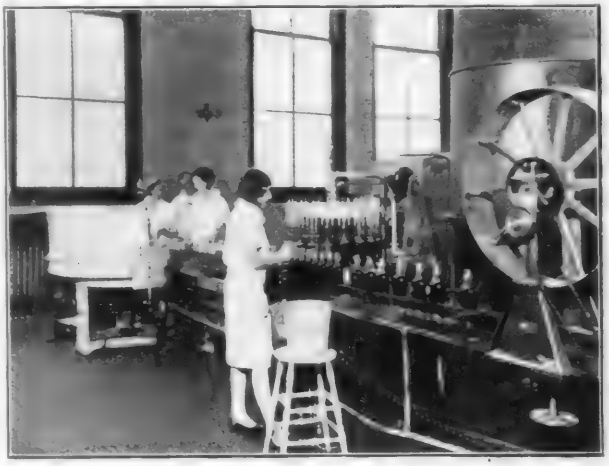
Centrifugal Separators.

The other day we were fortunate in making the round of the London Testing Station and Research Laboratories of the Super-Centrifugal Engineers, Ltd., and saw some of the types of the Sharples Super-Centrifuges which are employed in large numbers of food factories in various parts of the world. These machines are used, in general, for the classification of liquids of all descriptions, such as fruit juices, olive oil, cocoa butter, soups, gelatine, and so on. It is impossible here even to mention the great diversity of applications of these machines. Manufacturers who are up against any filtering or clarifying and similar problems will be well advised to get into touch with the technical department of this progressive firm of engineers.

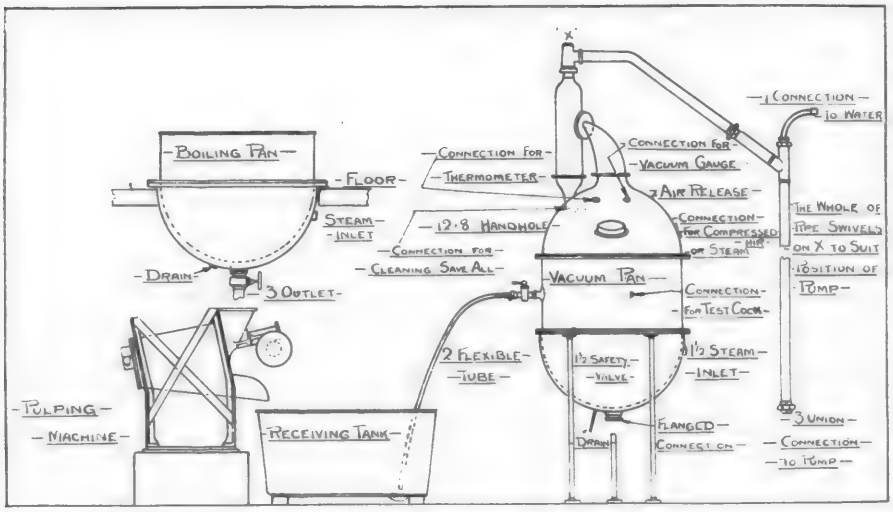
* * *

Filling Machines for Sauces, etc.

We illustrate the well-known Karl Kiefer Automatic Rotary Vacuum Filling Machine, showing also the feed conveyor and corking conveyor. This machine can be advantageously used for sauces, catsup, and the like. Mr. Du Mont, who represents this company over here, is a recognised authority on the equip-



ment of food factories with labour-saving filling and packing machinery of the latest design and is probably, more than anyone else, responsible for the introduction into European factories of economical and high-speed methods of filling and



Lay-out of Vacuum Plant for Tomatoes.

(By courtesy of Messrs. William Brierley, Collier, and Hartley, Ltd.)

packing, such as are in general use in the United States of America. Mr. Du Mont has had a unique experience in this important and hitherto somewhat neglected field, and his work over here has met with remarkable success. Many of the foremost European manufacturers have consulted him and he has installed plant and designed lay-outs, with extremely gratifying results. Like many American experts, his services and advice are placed in a most generous fashion at the free disposal of all who are in any way interested in matters connected with automatic and labour-saving devices for the food industries.

* * *

Modern Plant for Pickle and Sauce Manufacture.

For many years past, experiments have been carried out on the suitability of different metals and other materials for use in the manufacture of pickles and sauces. It has always been the endeavour of manufacturers to produce their article without metal contamination and without allowing it to come into contact with the hands at any stage in the manufacture. Thus, Messrs. H.P. Sauce, Ltd., of Birmingham, have spared no effort in the selection of suitable materials for plant and utensils in order to avoid all possibility of metallic or other contamination. Stainless steel and vulcanite are extensively used in dealing with the large output of this firm, where ingredients are never touched by hand. By way of example, we illustrate three machines supplied by Messrs. William Brierley, Collier, and Hartley, Ltd., which form part of the installation of Messrs. H.P. Sauce, Ltd.

The first two are Boiling and Mixing Machines, of which the pan is stainless steel throughout and all sauce contact metal made of stainless steel. It will be seen that the machine is fitted with a three-speed gear-box functioning in the same manner as a motor-car gear-box, so that different speeds can be obtained as desired.

Prior to the introduction of stainless steel pans of this type, cast-iron pans enamelled inside were extensively used, but were not recommended by the makers for steam pressure over approximately 30 pounds to the square inch owing to the danger of the enamel cracking, and this low pressure was a great drawback.

The third machine illustrated is that of a Fruit Stoning Machine, also made so that all fruit contact metal is stainless steel. This is to remove the skins and stones from the different fruits used. The machine has also been made enamelled throughout, but is not so successful as stainless steel; this was in the days of its infancy or even before the invention of stainless steel.

* * *

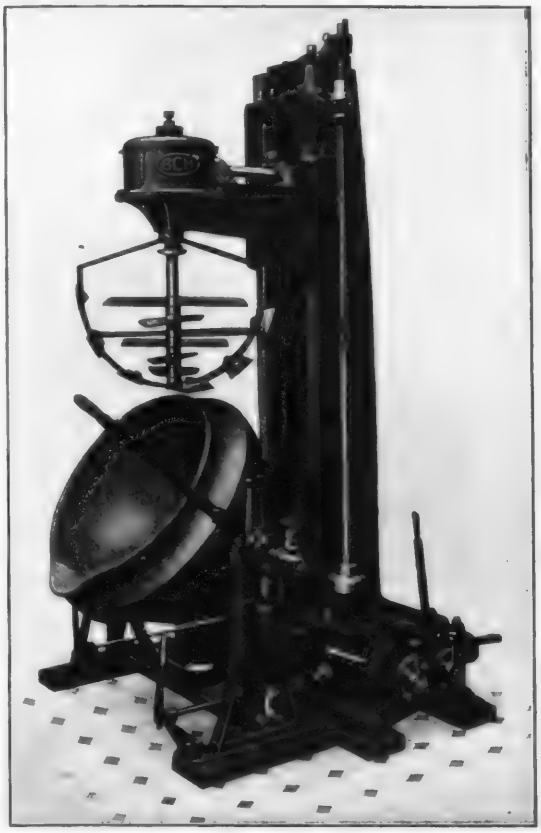
Plant for the Manufacture of Tomato Puree.

The accompanying diagram gives the lay-out (due to Messrs. Brierley, Collier, and Hartley) of plant used in the preparation of tomato pulp.

Tomatoes are first of all softened by boiling in the pan shown on the left-hand side at the top. This also bursts the skins of the tomatoes to a certain extent. From the pan they flow out

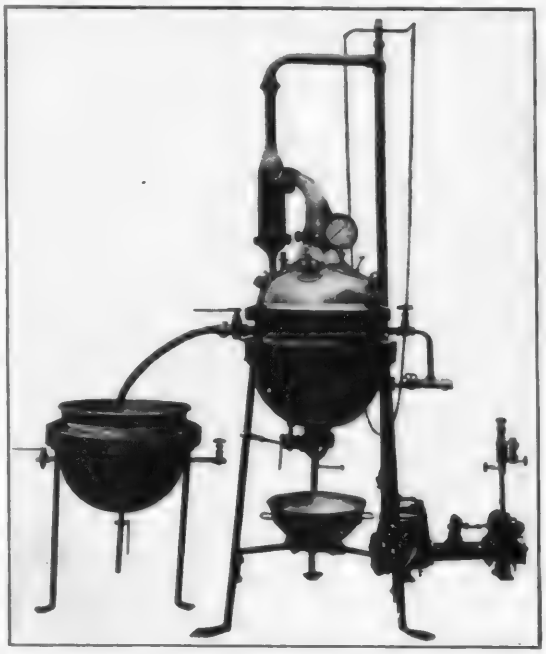
Pulping Machine.

(By courtesy of Messrs. William Brierley, Collier, and Hartley, Ltd.)



Automatic Vertical Mixer.

(By courtesy of Messrs. William Brierley, Collier, and Hartley, Ltd.)



Combined Open and Vacuum Pan.

(By courtesy of Messrs. William Brierley, Collier, and Hartley, Ltd.

through the bottom outlet into the pulping machine below. This removes the skins, etc., and from there the pulp flows into a receiving tank, when it is subsequently drawn up and the boiling completed in the vacuum pan. Although this plant has been used constructed from tin-lined copper, this coating of tin is not permanent, and a more modern method is to have the whole plant constructed from stainless steel or nickel.

Illustrations of the B.C.H. Fruit Pulping Machine, the Automatic Vertical Mixer, and the Combined Open and Vacuum Pan are given under the heading of "Plant for Pickle and Sauce Manufacture."

Two A.P.V. 100-gallon Pure Nickel Pans.

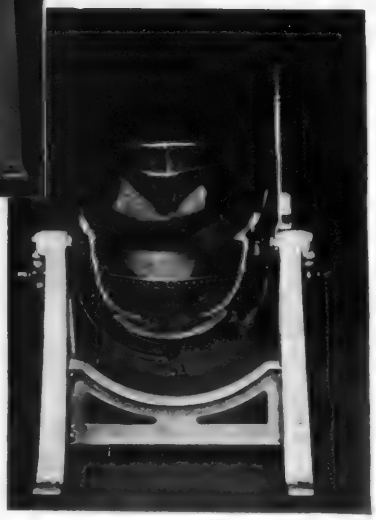
(By courtesy of the Aluminium Plant and Vessel Co., Ltd.)

Equipment for Pickle and Sauce Factories.

Special attention has been given by the Aluminium Plant and Vessel Company, Ltd., of London, to the equipment of factories with the plant and general equipment required in the manufacture of pickles and sauces. The illustration shows two different types of 100-gallon pure nickel pans, the larger pan being fitted with a stirrer. We also illustrate the 40-gallon A.P.V. Tilting Pans, one type of which has a steel jacket, and another type is fitted with a monel jacket. We understand that both forms of pans are in very successful use for the manufacture of pickles and sauces, many of the important sauce-making firms of the country having adopted them. The advantage of pure nickel for this particular purpose is that it eliminates all copper content, nickel itself, even if taken into solution, having been shown to be harmless to the human system.

A further advantage is that hitherto if copper has not been used, enamelled iron has been employed. Enamelled iron pans are very thick, and in addition to the thick iron basis there is the non-conducting enamel, so that heating is a very

The A.P.V. 40-gallon Tilting Pan with Monel Jacket.



The A.P.V. 40-gallon Tilting Pan with Steel Jacket.

slow process. As a result anything like tomato puree becomes darkened, and it is stated that with nickel pans a brilliant red puree is obtained which cannot be got by other means.

Another important machine for the sauce maker is the A.P.V. Pulping Machine in stainless steel, which was illustrated on p. 60 of the February issue of FOOD MANUFACTURE.

Much information of considerable value to the manufacturer is given in a booklet, entitled *Steam Pans and Mixing Plant*, recently issued by the Aluminium Plant and Vessel Company, Ltd.

* * *

Society of Chemical Industry.

For the first time for more than twenty years the Society of Chemical Industry will hold its full Annual General Meeting and Congress at Birmingham. This will take place throughout the week beginning July 14, under the Presidency of Dr. Herbert Levinstein.

Besides the usual ceremonies associated with the meeting, the programme will include visits to various works, among them being those of Messrs. Cadbury Bros. at Bournville, and Messrs. W. and T. Avery, Ltd., at Soho Foundry.

* * *

Double Seaming Machines.

The Premier Filterpress Co., Ltd., of London, have issued an extremely attractive booklet giving some useful particulars of machines and processes used for preserving under vacuum. Everyone interested in preserving and canning should certainly secure one of these booklets.

Cold Packing

THE fruit products laboratory of the University of California has improved the method of freezing fruits for the retail trade and extended this process to the preservation of vegetables. Messrs. Joslyn and Cruess report the results of their investigation in two numbers of the *Fruit Products Journal*. The procedure recommended for fruits consists in selecting firm, ripe fruit and preparing the larger varieties as if for canning. The goods are washed thoroughly with water, finishing with ice-cold water, if large containers be used. When the excess water has been removed the fruit is packed in friction top, paraffined cylindrical containers. It is then covered with ice-cold (40° B.) syrup. The use of syrup naturally assists in the preservation and prevents alteration during the course of the freezing interval. After packing, the containers are stored in the freezing room immediately, until frozen. They are then stored at 15° to 20° F. The directions for vegetables are similar, except that a cold dilute brine is used instead of syrup and the final storage is performed at a temperature under 15° F. Frozen fruits, especially berries, can be used in the home as a cold dessert, or, after thawing, as a preserve. The method was applied to a wide variety of fruits with excellent results. The application to vegetables is new and will require sales development. They are said to remain in excellent condition after several months.

(*Continued from page* 190.)

days in the distilled vinegar they are removed and placed in a spiced, sweet vinegar. This "sweet liquor" is composed of distilled vinegar, sugar, and whole spices such as cloves, coriander, mustard seed, broken ginger root, and mace.

Control.

The two principal problems in the manufacture of pickles are the satisfactory control of salt stock curing and the control of the softening of apparently good finished pickles. These, with the problems attendant on the handling of such corrosive materials as vinegar, sweet pickle syrup, brine, salt stock, and the mechanisation of sorting and grading, are at present not entirely solved. These problems are discussed and possible methods of control are outlined.

Financial News

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1929–1930)

1929.		1930.	
Feb. 7	5½ per cent.	Feb. 6	4½ per cent.
Sept. 26	6½ ,, ,,	Mar. 6	4 ,, ,,
Oct. 31	6 ,, ,,	,, 20	3½ ,, ,,
Nov. 21	5½ ,, ,,	May 1	3 ,, ,,
Dec. 12	5 ,, ,,		

As the consequence of keen competition and a severe deflation of values, the results of many concerns engaged in the food industry show a smaller balance of net profit as compared with the previous financial period, although the accounts of certain manufacturers of food specialities reveal satisfactory increases in spite of the difficult industrial conditions which prevailed during the greater part of the 1929 accounting period.

The amount of net profit realised by BARKER AND DOBSON, LTD., the chocolate and confectionery manufacturers with factories at Liverpool and depôts at Birmingham and Manchester, was £20,602 for the year ended December last, this figure being a reduction of £6,268 compared with the profit for the previous twelve months. From the 1928 appropriation the substantial sum of £114,846 was brought in, giving a disposable balance of £135,448, which was allocated as shown below :

	£
7% dividend on £198,626 Cumulative Preference Shares	13,904
Transferred to General Reserve	50,000
Allocated to Contingency Fund	5,000
Carried forward	66,544
	£135,448

The company's ordinary share capital amounts to £175,000, and is largely held by directors. In 1927 a dividend of 6 per cent. was paid on the ordinary shares. Recently the preference shares were quoted at Liverpool at 18/6, at which price they yield well over 7½ per cent.

Having regard to the keen competition in filtration and water softening plant, purifying apparatus, etc., the credit balance of £17,257 shown in the trading account of BELL BROTHERS (MANCHESTER, 1927), LTD., for the year ended March 31, 1930, is very satisfactory. From this figure of gross profit must be deducted £2,274, representing depreciation written off the book value of wasting assets, £1,300 for directors' fees, and £670 for expenses in connection with the reduction of capital involved in the scheme of reconstruction, the result being a net profit of £13,013. This amount was allocated in the following manner :

Preference dividend arrears, viz., ½ year's dividend on—

	£
£75,000 10% Cumulative Participating Preference Shares to March, 1929	3,750
1 Year's Preference Dividend to March, 1930	7,500
Transferred to Reserve	1,000
Carried forward	763
	£13,013

Some of the principal balance sheet items are compared below :

	March 31, 1930	*March* 31, 1929
	£	£
Cash	16,439	23,179
Stock	21,433	10,591
Debtors	11,151	16,459
Creditors	9,838	11,584
Goodwill	6,784	13,914

The issued capital of the company amounts to £100,000, and consists of £75,000 preference shares of 15/- each, which were recently quoted at 12/3, and the balance in ordinary shares of 6d. each, which stand at about par. The fact that over £4,000 expenses debited to the profit and loss account will not appear in the next accounts renders the prospect of a resumption of dividends on the ordinary capital in the near future very promising.

For the year ended January 31, 1930, the net profit realised by the OVERSEAS TRADING CORPORATION, LTD.—formed in 1920 to acquire WALKERS, LTD., of Jersey and Buenos Aires, and the export business of W. H. AND F. HORNIMAN, LTD.—amounted to £51,338, and to this must be added £4,907 brought forward from the previous appropriation. The disposable balance, therefore, was £56,245, and this amount was dealt with as follows :

	£
6% dividend on £77,500 Cumulative Preference Shares	4,650
10% dividend on £109,400 "A" Cumulative Preference Shares	10,940
10% dividend on £80,000 "B" Cumulative Preference Shares	8,000
15% dividend on £80,000 Preferred Ordinary Shares	12,000
Transferred to Reserve	15,000
Carried forward	5,655
	£56,245

Last year a dividend of 10% was paid on £130,120 ordinary shares of £1 each, in addition to dividends on the above issues.

The final accounts of MITCHELL AND MUIL, LTD.—the old-established wholesale and retail bakers, biscuit manufacturers, etc.—are made up to the last Saturday in February, and during the accounting period, which terminated on February 22 last, a net profit of £17,668 was realised. After adding the sum of £4,859 brought in from the previous account, the balance for disposal was £22,527, and this amount was divided thus :

	£	£
6% dividend on £30,000 Cumulative Preference Shares	1,800	
Less tax at 4/- in £1	360	
		1,440
27½% dividend on £30,000 Ordinary Shares (tax free)		8,250
Transferred to Reserve		4,000
Transferred to Dividend Equalisation Fund		1,000
Depreciation		3,000
Carried forward		4,837
		£22,527

The accounts of INGLIS AND CO., LTD.—bread and cake makers, flour importers, etc.—are usually made up as near as possible to the end of April, and, after deducting debenture interest, the profit realised during the period to May 3, 1930, amounted to £67,827, to which must be added the sum of £26,137 brought forward from the previous appropriation. Some of the principal final figures for the past two financial years are compared below :

	1930.	1929.
	£	£
Profit	68,083	65,642
Debenture Interest	1,156	1,198
To Reserve	5,000	5,000
Inglis Employés Benefit Fund	2,000	2,000
Superannuation Fund	1,407	3,000
Written off Land, Buildings, etc.	10,000	10,000
Written off Investments	10,000	Nil

	1930. £	1929. £
Carried forward	28,491	26,137
Dividend on Ordinary Shares ...	25%	25%
Dividend on Employés Shares ...	25%	25%

The issued capital of the company consists of £45,000 6% cumulative preference shares, £15,000 employés shares, and £124,000 ordinary shares, all £1 each.

A small decrease is shown in the balance of profit made by FITCH AND SON, LTD.—wholesale, retail, shipping, and export provision merchants—the figure for the year ended March 31 last being £29,833 as compared with £30,102 for the previous twelve months. After debiting fees, reserve, and amounts written off, the net profit is £22,476, to which must be added £6,457 brought in from the 1928-29 appropriation, giving a disposable balance of £28,933. In November last an interim dividend of 4% was paid on the ordinary shares, and a final dividend of 4%, making 8% for the year, has now been paid, the appropriation account being made up as follows:

	£
8% dividend on £142,301 Participating Preference Shares	11,384
8% dividend on £136,630 Ordinary Shares	10,930
Carried forward	6,619
	£28,933

Since the registration of the company in 1920, the same rate of dividend has been paid each year to the ordinary shareholders.

For the year which terminated at December 31, 1929, the profit and loss account of the BRITISH OIL AND CAKE MILLS, LTD., shows a net profit of £583,331 compared with a credit balance of £610,885 shown in the previous account. This decrease is the result of the unexpected collapse in cereal values during the latter months of the year, and in reducing the dividend on the ordinary share capital from 6% to 3% a much larger balance is brought forward to the current year as a safeguard against the continued depreciation in stock values. The appropriation account is made up as shown below:

	£
Brought forward	30,879
Net Profit—Year ended December 31, 1929 ...	583,331
	£614,210
5½% dividend on £743,103 Cumulative Preference Shares	£ 40,871
12½% dividend on £2,909,021 Cumulative Preferred Ordinary Shares	363,628
3% dividend on £3,500,000 Ordinary Shares	105,000
Carried forward	104,711
	£614,210

The trading account of MONTGOMERIE AND CO., LTD.—manufacturers of various food specialities—covering the financial year to April 30 last, shows a credit balance of £16,367, which is an increase of £3,645 over the corresponding balance of the 1928-29 account. Against this must be set £2,870 under the heading of income tax, and £1,980 for depreciation, leaving £11,517 as the net figure to which has been added the sum of £22,556 brought forward from the previous year, giving a disposable balance of £34,073. This amount has been allocated as follows:

	£	£
5% dividend on £28,815 Cumulative Preference Shares	1,441	
Less tax at 4/- in the £ ...	288	
		1,153
Transferred to Development Account		5,000
15% dividend on £62,646 Ordinary Shares ...	9,397	
Less tax at 4/6 in the £ ...	2,115	
		7,282
Carried forward		20,638
		£34,073

Some of the principal figures shown in the accounts for the past two financial years are compared below:

	April 30, 1930. £	*April* 30, 1929. £
Trading Profit	16,367	12,722
Income Tax	2,870	nil
Depreciation	1,980	2,147
Net Profit	11,517	10,575
Preference Dividend	1,153	1,153
Ordinary Dividend	15%	15%

The preference dividend is paid in April and October, and recently the shares were quoted at Edinburgh at 12/3. At 33/- the ordinary yield over 9%.

FOOD INDUSTRY STOCK AND SHARE LIST

	June, 1930.	*Par Value.*	*May*, 1930.
Aerated Bread: Ord.	17/3	£1	19/3
6½% Pref.	18/8	£1	19/-
Apollinaris: Ord.	8/-	£1	7/6
Assoc. Biscuit: 6½% Pref. ...	22/3	£1	23/1
Avery (W. and T.): Ord. ...	52/-	£1	53/3
Bovril: Ord.	23/6	£1	23/9
Deferred	39/6	£1	40/3
6% Pref.	21/6	£1	21/6
4½% Deb.	85	£100	85
British Aluminium: Ord. ...	38/6	£1	44/-
6% Pref.	21/-	£1	21/6
British Thomson Houston: 7% Pref.	22/9	£1	24/-
Cadbury: 8% 2nd Pref. ...	26/9	£1	27/6
Carrs: 6½% Pref.	20/6	£1	20/6
Cerebos: Ord.	6 1/16	£1	6¼
Chivers: 6% Deb.	100	£100	99½
Cinzano: 7½% Pref.	21/6	£1	21/5
Clark's Bread: Ord.	20/9	10/-	20/10
Crosse and Blackwell: Ord. ...	2/3	1/-	2/10
7½% Pref.	12/8	15/-	14/3
English Margarine: Pref. ...	21/-	£1	1¼
Foster Clark: Ord.	49/-	10/-	49/9
Fry's: 8% "B" Preferred ...	21/10	£1	21/10
H.P. Sauce: Ord.	95/-	£1	5¼
Hill (W.): Ord.	⅜	£1	⅜
Home and Colonial: Ord. ...	17/3	4/-	17/6
15% Cum. Ord.	51/3	£1	52/6
6% Cum. Pref.	5⅜	£5	5 9/32
Hovis: 6% Cum. Pref. ...	22/3	£1	22/3
Imperial Chemical: Ord. ...	22/7	£1	25/3
Deferred	7/-	10/-	7/8
7% Cum. Pref.	23/5	£1	24/6
International Tea: Ord. ...	23/9	5/-	24/2
6% 1st Pref.	22/9	£1	21/9
7% "A" Pref.	23/-	£1	24/6
Liebigs: (Reg.)	14⅜	£5	16¼
(Bearer)	15⅛	£5	16 5/16
5% Pref.	90/-	£5	93/2
Lipton: Ord	4/10	1/-	4/5
5% 1st Pref.	8/-	10/-	7/5
6% Pref.	8/1	10/-	8/3
6% Deb.	97	£100	96
Lyons: Ord.	96/6	£1	97/-
"A" Ord.	95/7	£1	95/-
5% Pref.	20/-	£1	19/6
6% Preferred	21/4	£1	21/3
7% Pref.	25/4	£1	23/3
8% Pref.	27/6	£1	28/11
Maypole Dairy: 20% Preferred	16/2	5/-	16/7
Deferred	5/5	2/-	5/3
5% Pref.	19/6	£1	19/6
Meadow Dairy: 7½% Pref. ...	24/2	£1	24/4
Nathan (J.): Ord.	2/9	1/-	2/6
7% Pref.	17/6	£1	18/-
8% Preferred	7/9	10/-	7/6

	June, 1930.	*Par Value.*	*May*, 1930.
Nestlés: 8% Pref.	28/8	£1	29/2
Pascall (J.): 8% Preferred ...	10/8	£1	10/7
Peak Frean: 5% Pref. ...	17/9	£1	17/-
8% "A" Pref.	25/9	£1	25/6
Radcliffs Edible: Ord. ...	2/3	1/-	2/7
8% Pref.	9/-	10/-	9/6
Radiation: Ord	37/-	£1	39/3
6% Pref.	22/6	£1	21/10
Scribbans: Ord.	14/5	£1	13/-
Deferred	1/11	1/-	1/10
Schweppes: Deferred	34/3	£1	36/-
4% Deb.	75	£100	75
Smith's Potato Crisps: Ord. ...	8/4	5/-	8/9
Spiers and Pond: Ord. ...	16/8	10/-	18/9
6½% Pref.	19/6	£1	20/5
5% Deb.	95	£100	95
Spillers: Ord.	19/-	£1	19/5
6% Pref.	17/3	£1	18/6
Deferred	5/6	£1	6/4
Tate and Lyle: Ord.	38/3	£1	41/6
6½% Pref.	22/10	£1	22/7
Unilever: Ord.	40/-	£1	62/3
7% Preferred	23/-	£1	23/5
Union Cold Storage: 6% Pref.	19/10	£1	19/10
7% Pref.	21/2	£1	21/3
10% Pref.	25/8	£1	25/7
United Caterers: Ord. ...	8/2	5/-	8/2
United Dairies: Ord. ...	31/2	£1	31/4
6% Pref.	20/10	£1	21/3
United Glass Bottle: Ord. ...	21/-	£1	24/-
United Molasses: Ord. ...	56/-	£1	3½⅜

London Gazette Information

PATENTS AND DESIGNS ACTS, 1907 to 1928

Application for Restoration of Lapsed Patent under Sect. 20.

Mr. Walter Voss has made application for the restoration of the patent granted to him for an invention entitled "Improvements in Dropping Stoppers or Closures for Bottles," numbered 230,099 (5593 of 1925), and bearing date under the International Convention, February 29, 1924, which expired on February 29, 1928, owing to non-payment of the prescribed Renewal Fee.

Any person may give notice of opposition to the restoration by leaving Patents Form No. 17 at the Patent Office, 25, Southampton Buildings, W.C. 2, on or before July 28, 1930.

Book Review

Handbook of Chemistry and Physics. 14th edition. Compiled by Charles D. Hodgman and Norbert A. Lange. Published by Chemical Rubber Co. Inc., Cleveland, Ohio. 1930. Leather-cloth, pp. xii-1,386, price $5.00.

Continuing the past custom, this monumental work of reference has been again brought up to date with a thorough revision and sundry useful additions. While retaining the former arrangement which has commended itself to users, the compilers have introduced new matter, often suggested by chemists and physicists who have found benefit from the book in the past. While including facts and tables on all branches of the two sciences, it has been thought politic to omit types of material used only in highly specialised branches; this has been decided upon, not only with a view to keeping the volume within practical bounds, but also to give opportunity for the accumulation of fresh knowledge in such subjects.

The modern intimacy between chemistry and physics, resulting from recent research, renders such a reference book of great value to practitioners in both directions. It is perhaps rather surprising to find that all references to rubber have been omitted, in spite of the enormous importance of the industry. In the table of density of various solids on p. 803, described in the index as "Modulus, bulk, table," the density of indiarubber is given. The index reference to "Elastic limit table," p. 815, is found to be a part of the compressibility of gases, which does not get the reader much further in his search for information. These and similar errors will doubtless be corrected in subsequent editions. In searching for dietary standards, for instance, it is found indexed as the same page, 803, which has done duty incorrectly before. However, by looking up Food Functions, the correct page can be found, and doubtless other errors may be neutralised in the same way.

Among the new tables included in the present edition will be found one on the wave lengths of the emission spectra of the elements, shrinkage conversion tables in the ceramics section, several new humidity and barometric tables, notes on the transmission of ultra-violet and infra-red rays through glasses, heat and combustion tables, and of special interest to the lacquer and varnish maker is the table of constants of resins and gums.

One of the features of the book is the description of the elements, in which will be found in epitome all that is known of those rarities in the atomic list that are scarcely more than names to many of us, such as: Dysprosium, Europium, Hafnium, Holmium, Illinium, Masurium, Rhenium and the Ytterbium, Yttrium, Terbium and Erbium group.

Towards the end of the book will be found a number of chemical and physical problems, with their solutions, which will probably be useful to students in getting the correct "angle" for such work. The definitions of terms, quantities, and units is also a valuable contribution, so are the 100 chemical equations. There is wisdom shown, too, in opening the book with antidotes for poisons and precautions for various types of fires. When these are needed there is no time to hunt through an inaccurate index.

Apart from this fault, upon which emphasis has been justly laid, this is a most valuable reference book, and one which should be on the shelf in every chemical or physical laboratory, as there seem to be very few questions to which it cannot supply lucid answers. It is of a handy size, and the pages lie flat when it is opened—a great asset.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.

New Companies

F. T. NORTON, LIMITED. (247568.) To take over the bus. of a grocer and provision, wine and spirit mcht. and genl. stores cd. on at Langport, Somerset, by F. T. Norton. Nom. Cap.: £1,000 in 900 pref. shares of £1 and 2,000 deferred shares of 1s. each.

F. J. POLLARD, LIMITED. (247717.) Marlboro' Road, St. Albans. To take over the bus. of a wholesale grocer cd. on at St. Albans by F. J. Pollard. Nom. Cap.: £5,000 in £1 shares (1,000 pref. and 4,000 ord.).

HARDY AND SON, LIMITED. (247641.) 25, Brown Street, Salisbury, Wilts. To carry on the bus. of grocers and genl. provision mchts., etc. Nom. Cap.: £20,000 in £1 shares (12,000 pref. and 8,000 ord.).

DEE BROS., LIMITED. (247636.) 16, Fairfax Road, W.4. To carry on the bus. of importers, exporters, and mnfrs. of and dlrs. in chocolate, sweets, etc. Nom. Cap.: £100 in £1 shares.

C. MCHUGH, LIMITED. (247692.) To take over the bus. cd. on at 71, Broad St., Salford, by Charles McHugh, and to carry on the bus. of grocers and provision dlrs. Nom. Cap.: £1,000 in £1 shares.

PEAREY AND CAMPBELL, LIMITED. (247824.) 10, Railway Street, North Shields. To take over the bus. of wholesale and retail grocers and provision mchts. cd. on at North Shields, Cullercoats, and Whitley Bay as "Pearey and Campbell." Nom. Cap.: £1,500 in £1 shares.

HOME SUPPLIES, LIMITED. (247963.) 101, Leadenhall Street, E.C.3. To carry on bus. in connection with the sale of fresh fruit and vegetables, fish, etc. Nom. Cap.: £200 in £1 shares.

HILL AND STEPHENSON, LIMITED. (248096.) To carry on bus. as wholesale and genl. corn and cake mchts., etc. Nom. Cap.: £2,000 in £1 shares.

DEE VALE DAIRY COMPANY, LIMITED. (248094.) To carry on the bus. of preparers and mchts. of homogenised sterilised milk; wholesale and retail dairymen, etc. Nom. Cap.: £1,500 in £1 shares.

J. HIBBERT AND SON, LIMITED. (248099.) 82, Martins Lane, Wallasey. To carry on the bus. of bakers and confectioners, etc. Nom. Cap.: £1,000 in £1 shares.

SCHWARTZ, LIMITED. (248077.) 33a, Fournier Street, Spitalfields, E.1. To take over the bus. of a wholesale and retail egg mcht. and provision dlr. cd. on at Fournier St., E.1, by S. Schwartz. Nom. Cap.: £2,500 in £1 shares.

CLIFFORD NICHOLLS AND COMPANY, LIMITED. (248093.) To carry on the bus. of wholesale and retail wine, spirit, and beer mchts., etc. Nom. Cap.: £150 in £1 shares.

WESTMINSTER NATIONAL SUPPLIES, LIMITED. (248036.) 14 and 16, Old Swan Lane, Upper Thames St., E.C.4. To carry on the bus. of provision mchts., grocers, etc. Nom. Cap.: £1,000 in £1 shares.

SWEETMAKERS, LIMITED. (247910.) The Chocolate of Excellence Factory, Bath Rd., Hounslow, Middlesex. To mnfr. chocolate, sweetstuffs, etc. Nom. Cap.: £1,000 in £1 shares.

F. G. CURREY, LIMITED. (248191.) 169-171, Albert Road, Southsea. To take over the bus. of a pork butcher and provn. mcht. cd. on at Southsea as "F. G. Currey." Nom. Cap.: £2,000 in £1 shares.

MAISON BONIVARD, LIMITED. (248441.) 17, Gillingham Street, Westminster, S.W. 1. To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £1,000 in £1 shares (200 pref. and 800 ord.).

UNITED PRODUCE DISTRIBUTORS, LIMITED. (248230.) To take over the bus. cd. on at 48, Willifield Way, N.W. 11, as "United Produce Distributors." Nom. Cap.: £1,000 in 940 ord. shares of £1 and 1,200 founders shares of 1s.

NATIONAL MILLING IMPROVEMENTS, LIMITED. (248140.) 90, Bishopsgate, E.C. 2. To acquire the patent and other rights in the "Dunham Process," to enter into an agmt. with Goligher and Phillips, Ltd., and Patent Underwriting, Ltd., to carry on bus. as millers of wheat and other cereals, and to develop the Dunham process of milling, etc. Nom. Cap.: £10,000 in 9,000 "A" shares of £1 and 10,000 "B" shares of 2s. each.

PEACOCK AND COMPANY (TOOLEY STREET), LIMITED. (248251.) To take over the bus. of wholesale produce importers cd. on at 65, Tooley Street, E.C., as "Peacock and Co." Nom. Cap.: £1,000 in £1 shares.

PERRYWOOD CONFECTIONERY COMPANY, LIMITED. (248110.) 3a, Sam's Lane, West Bromwich. To take over the bus. cd. on at West Bromwich as the Perrywood Confectionery Co. Nom. Cap.: £2,000 in £1 shares.

CLIFTON'S COFFEE COMPANY, LIMITED. (248240.) 3, Newport House, 16, Great Newport Street, W.C. 2. To acquire patents and rights to mnfre. coffee in a form ready for use, etc. Nom. Cap.: £10,000 in 9,000 ord. shares of £1 and 20,000 founders shares of 1s. each.

MANN'S STORES, LIMITED. (248106.) 2, Hickling Road, Ilford Lane, Ilford. To take over the bus. of a wholesale grocer and hardware sundriesman cd. on at Ilford by A. M. Mann. Nom. Cap.: £2,000 in £1 shares.

WENNINK, LIMITED. (248314.) 1-2, Montague Close, London Bridge, S.E. 1. To take over the bus. of an egg and provision importer, mcht., and factor cd. on at Montague Close, S.E., and elsewhere, as "J. A. Wennink and Co." Nom. Cap.: £10,000 in £1 shares.

KROOKS (POTATO) KRISPS, LIMITED. (248338.) To carry on the bus. of mnfrs. of and dlrs. in cooked potato specialities. Nom. Cap.: £3,000 in 5s. shares.

H. W. GARROD AND COMPANY, LIMITED. (248422.) Produce Exchange Buildings, Victoria Street, Liverpool. To carry on the bus. of dried fruit and cereal mchts., etc. Nom. Cap.: £12,000 in £1 shares (5,000 "A," 5,000 "B," and 2,000 "C").

SUNFIELDS, LIMITED. (248182.) 24, Russell Chambers, Covent Garden Market, W.C. 2. To carry on the bus. of a wholesale and retail greengrocers and fruiterers, etc. Nom. Cap.: £1,000 in £1 shares.

HEWETT FISHING COMPANY, LIMITED. (248246.) 1, Cross Lane, E.C. To carry on the bus. of steamship owners, fishers, etc. and perry mnfrs., restaurant keepers, etc. Nom. Cap.: £3,000 Nom. Cap.: £5,000 in £1 shares.

CHARLES BYRD AND SONS, LIMITED. (248478.) Cooper's Lane, Evesham, Worcs. To take over the bus. cd. on at Evesham as "Charles Byrd and Sons," and to carry on the bus. of cider in £1 shares (2,000 pref. and 1,000 ord.).

J. F. PAYNE AND SONS, LIMITED. (248486.) To take over the bus. of a baker and confectioner as formerly cd. on at Market Place, Gold St. and Montague St., Kettering, as "J. F. Payne and Sons." Nom. Cap.: £3,000 in £1 shares.

MARIEMONT HOTEL, LIMITED. (248593.) Mariemont, Westbourne Road, Edgbaston, Birmingham. To carry on the bus. of hotel proprs., wine and spirit mchts., etc., and to take over the bus. cd. on at Mariemont, Westbourne Rd., Edgbaston. Nom. Cap.: £1,000 in £1 shares.

JEFFERIES MARKET, LIMITED. (248588.) 446, Becontree Avenue, Chadwell Heath, Essex. To carry on the bus. of wholesale and retail grocers, etc. Nom. Cap.: £100 in £1 shares.

MATURA PRODUCTS, LIMITED. (248597.) To acquire the benefit of the regd. trade mark "Matura" together with the goodwill of the bus. concerned in the goods for which the said trade mark has been regd., and to carry on the bus. of mnfrs. of and dlrs. in agricultural foodstuffs. Nom. Cap.: £2,400 in £1 shares.

WOODBRIDGE CANNING COMPANY, LIMITED. (248540.) To take over the bus. of a canner cd. on at Angel Lane, Woodbridge, Suffolk, by J. Feloy. Nom. Cap.: £5,000 in £1 shares (1,000 pref. and 4,000 ord.).

DOWNHAM STORES, LIMITED. (248516.) 449, Downham Way, Bromley, Kent. To carry on the bus. of confectioners and tobacconists, fish mchts, bakers, grocers, etc. Nom. Cap.: £2,000 in £1 shares.

C. KUNZLE, LIMITED. (247476.) Five Ways, Birmingham. To take over the bus. of mnfg. and wholesale and retail confectioners, etc., cd. on at Birmingham, London, Leicester, and elsewhere, as "C. Kunzle." Nom. Cap.: £170,000 in £1 shares (50,000 pref. and 120,000 ord.).

COWBURNS, LIMITED. (248514.) Mineral Water Works, Abinger Street, Burnley. To take over the bus. of mineral water, cordial, and pickle mnfrs. cd. on at Burnley, Wigan, Stoke-upon-Trent, Long Eaton, and Nuneaton, as "Cowburn Bros." Nom. Cap.: £20,000 in £1 shares.

BURTONS (STOCKTON), LIMITED. (248475.) 2, Wellington Street, Stockton-on-Tees. To acquire the freehold property No. 2, Wellington St., Stockton-on-Tees, and to carry on the bus. of wholesale and retail fish and fruit mchts., etc. Nom. Cap.: £3,000 in £1 shares.

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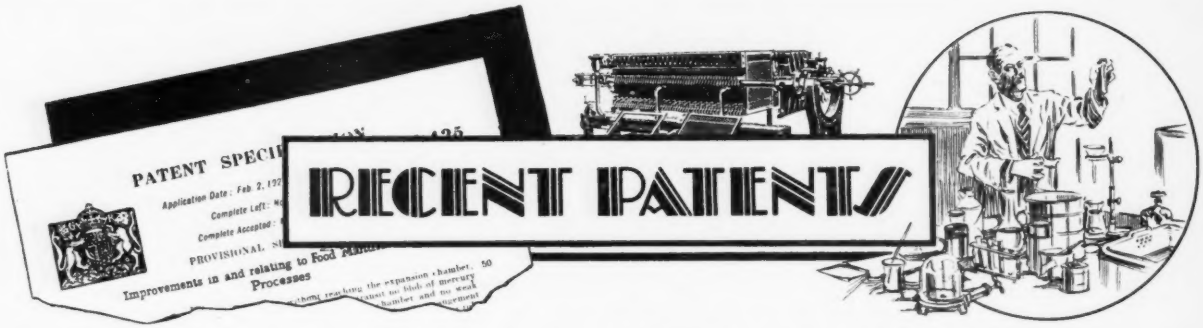
288. Discoloration and Corrosion of the Inner Surfaces of Containers for Canned Foods. W. D. Bogatsky and others. (*Z. Unters. Lebensm.*, 1929, 58, p. 506.)

289. The Lacquering of Food Containers and Closures. A. Ll. Matthison. (*J.S.C.I.*, 1930, No. 23, p. 474.)



RECENT PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office.

Latest Patent Applications

17604. INGRAM, W. L.: Airtight containers for foodstuffs, etc. June 6.

16977. PATRICK, A.: Containers for food, etc. June 2.

15646. SONSTHAGEN, A.: Mill for grinding chocolate, etc. May 21.

15026. ANDERSSEN, F.: Vessels for pasteurisation of food products, etc. May 15.

14686. DISTILLERS CO., LTD., AND EYRE, J. V.: Manufacture of yeast. May 13.

Specifications Published

328,942. CLARK, G. M. (MATRO GES.).: Production of extracts for direct application as medicaments, and also for increasing the vitamin content of foodstuffs, medicaments, and the like.

Printed copies of the full Published Specifications may be obtained from the Patents Office, 25, Southampton Buildings, London, W.C. 2., at the uniform price of 1s. each.

Abstracts Published

328,075. **Baked food products.** BOLLMANN, H., 3, Alsterdamm, and REWALD, B., 36, Grindelberg, both in Hamburg, Germany.

In the production of bakery goods, confectionery, pastries, etc., in place of egg-yolk and the whole or a portion of the fat normally employed, use is made of a mixture comprising food fat and a quantity of lecithin not less than 5 per cent. of the food fat. The mixture may comprise 900 grams of butter and 100 grams of soya lecithin, or 200 grams of lecithin emulsified in 800 grams of margarine. Specifications 19344/13 and 129,165 are referred to.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.

MERRIE ENGLAND.—511,669. **Tinned and bottled fruits and vegetables, fruit syrups (not alcoholic) and mincemeat.** BRITISH CANNERS, LTD., 10, Eastcheap, London, E.C. 3. May 14.

HIKING.—511,793. **Cocoa, chocolate, chocolate confectionery, and confectionery.** ROWNTREE AND CO., LTD., The Cocoa Works, Wigginton Road, York. May 14. (Associated.)

FOAM-ADE.—511,862. **Beverages (not alcoholic, not medicated, and not aerated).** SUTCLIFFE AND BINGHAM, LTD., Kkovah Works, Ogden Street, Cornbrook, Manchester. May 14.

GLACETTE.—510,581. **Biscuits.** PEEK, FREAN AND CO., LTD., 158, Drummond Road, London, S.E. 16. May 7.

FLAVOX.—511,343. **Gravy powder, gravy colouring, and flavouring, and gravy salt.** THE BIRMINGHAM FOOD SUPPLY CO., LTD., Victoria Works, Fallows Road, Sparkbrook, Birmingham. May 7.

HIBISCUS.—511,406. **Cheese.** KRAFT CHEESE CO., LTD., Silverdale Road, Hayes, Middlesex. May 7.

GLEAMING GEMS.—509,499. **Dried fruits.** BARRY BROTHERS, LTD., 37, Victoria Street, Liverpool. April 30.

SALMON'S TEA.—510,879. **Tea.** SALMON, LTD., 250, King's Road, Reading, and 6, Old Castle Street, London, E. 1. April 30. (Associated.)

SUNNY PEAK.—512,572. **Canned fruits and canned vegetables.** ALLIED SUPPLIES, LTD., 196, City Road, London, E.C. 1. June 11.

KLUK.—512,773. **Potted meat pastes and potted fish pastes.** J. H. SENIOR AND CO., LTD., 1, Willard Street, Wandsworth Road, London, S.W. 8. June 11.

FINEART.—511,810. **Tea and coffee, and preparations of tea and coffee.** THE BANTAM PRODUCTS, LTD., Bantam Works, Royds Lane, Wortley, Leeds. June 4.

INAJIFF.—509,583. **Green peas (for food).** WILLER AND RILEY (1910), LTD., 54, Corporation Street, Manchester. June 4. (Associated.)

KILTIE.—508,771. **Blancmange powders, table jellies, ice-cream powder, lemonade powder, lemonade crystals and fruit crystals.** PEARCE, DUFF AND CO., 126, Spa Road, Bermondsey, London, S.E. 16. June 4.

DR. JOHNSON.—511,897. **Biscuits.** A. ROMARY AND CO., LTD., 26, Church Road, Tunbridge Wells, Kent. May 28.

MILDANO.—512,218. **Bacon.** WEBER, LTD., 268, Central Markets, Smithfield, London, E.C. 1. May 28.

DANEB.—510,565. **Butter, bacon, cheese, and tinned meats.** NORTH OF ENGLAND BACON CO., LTD., 16, Fennel Street, Manchester, May 21. (By Consent.)

Correspondence

To the Editor.

DEAR SIR,

With reference to your paragraph "Pectin in Britain" in the June issue, based on some points raised by Mr. James Sommerville, Junr., would you permit us to mention that we have for some time been interested in dried apple pectin of American manufacture, and our experience of a steadily increasing demand for same does not bear out the assertion that importations from U.S.A. have fallen off, and that there is only one firm, and that apparently in Germany, manufacturing apple pectin.

We are, dear sir,

Yours faithfully,

H. MAYER SENIOR, LTD.